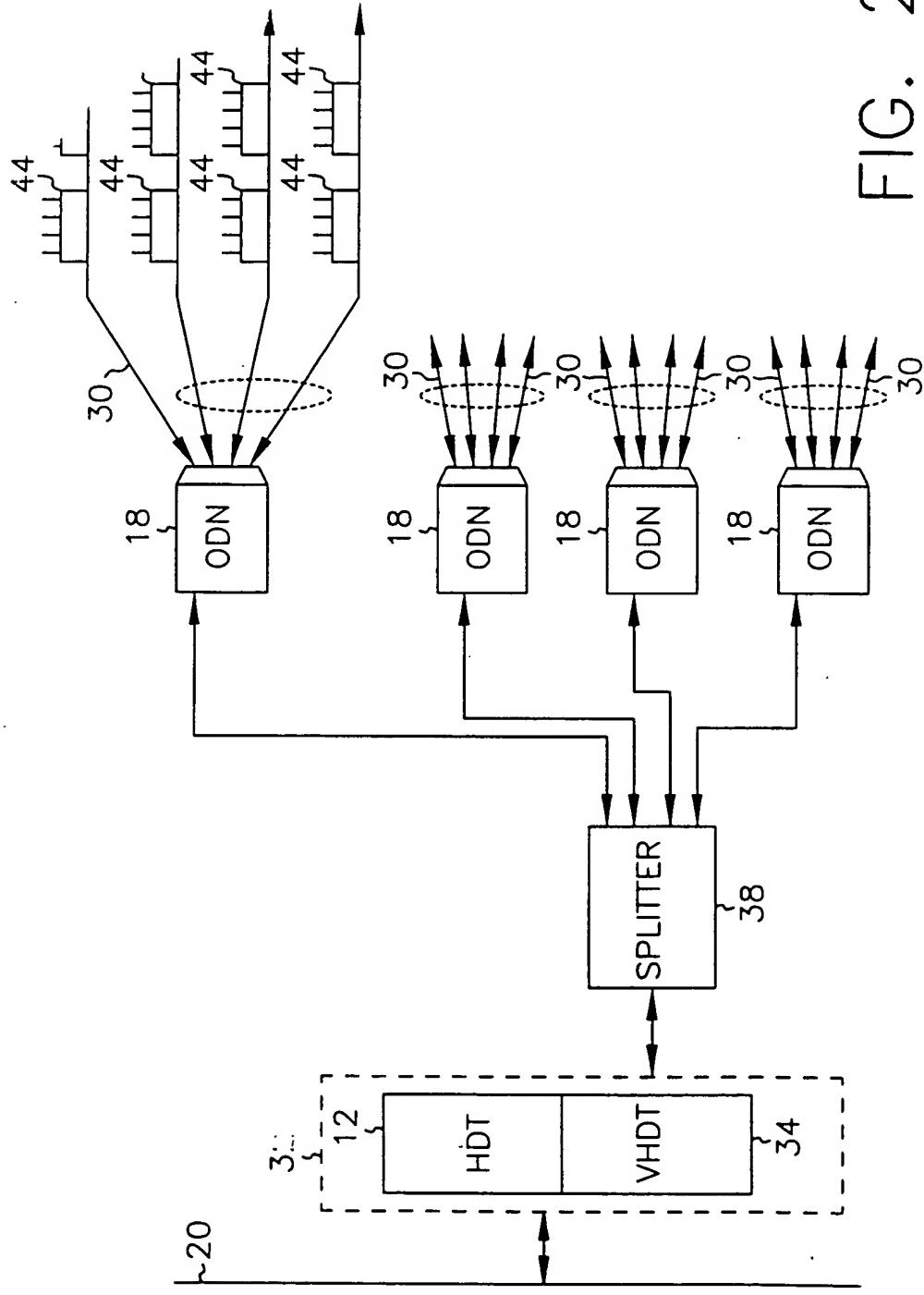


FIG. 1

FIG. 2



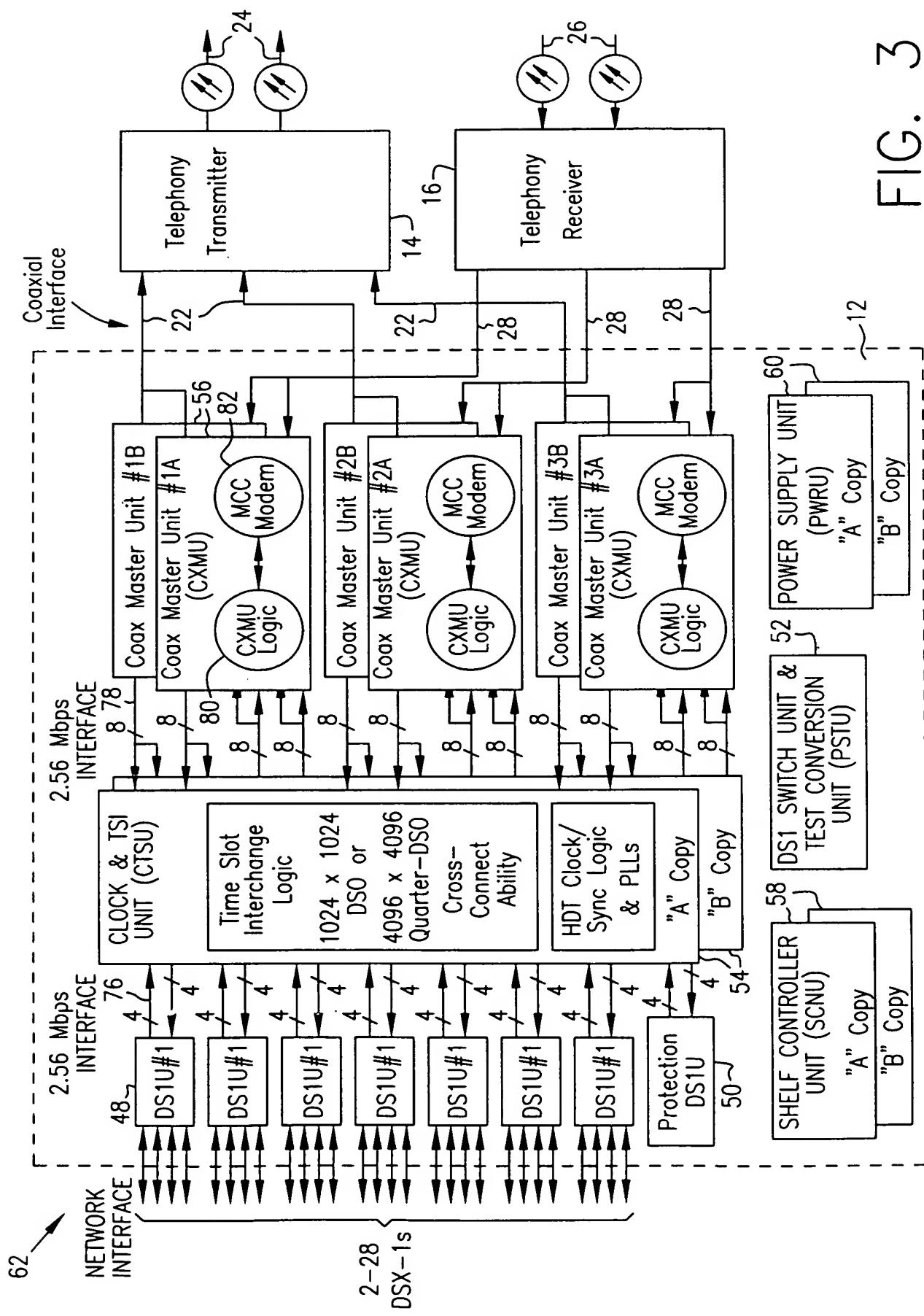


FIG. 3

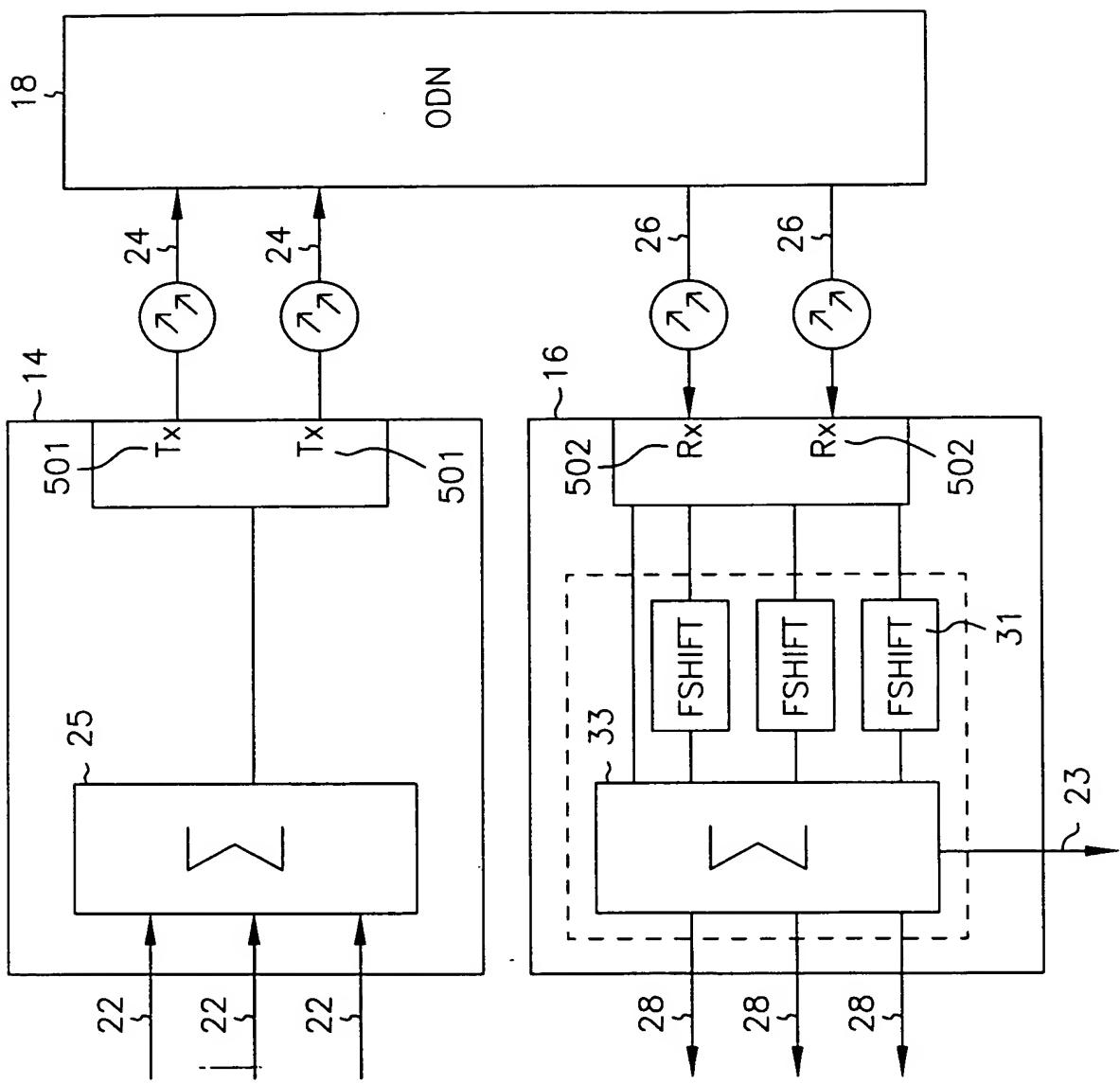


FIG. 4

FIG. 5

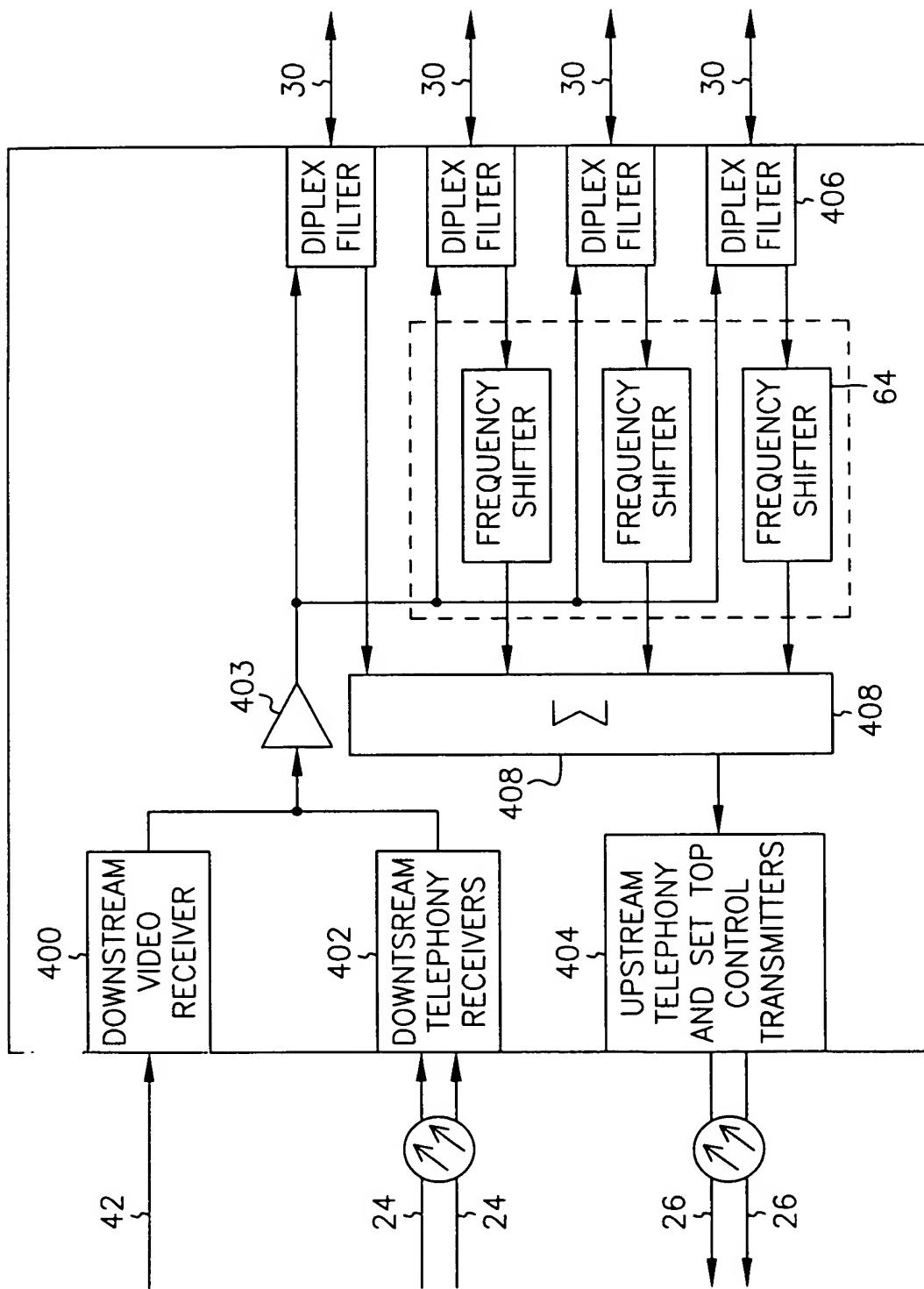


FIG. 6

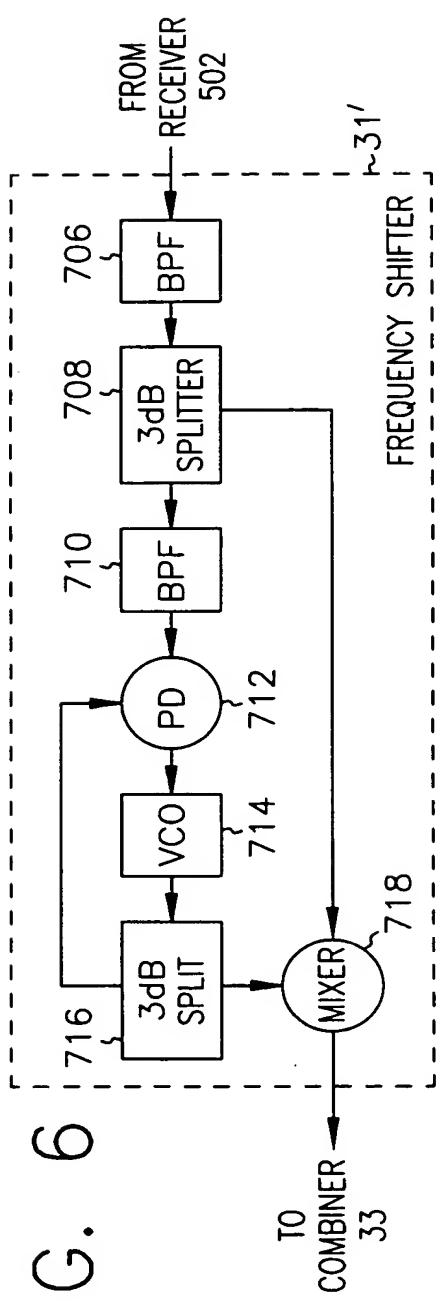


FIG. 7

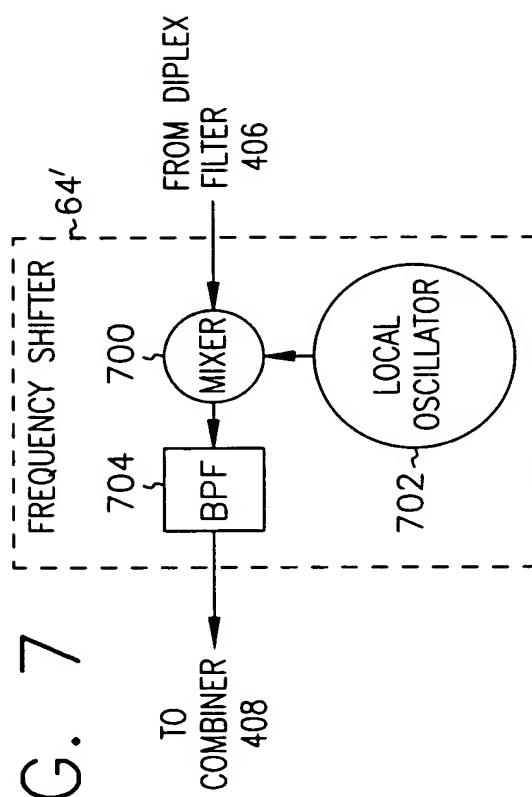
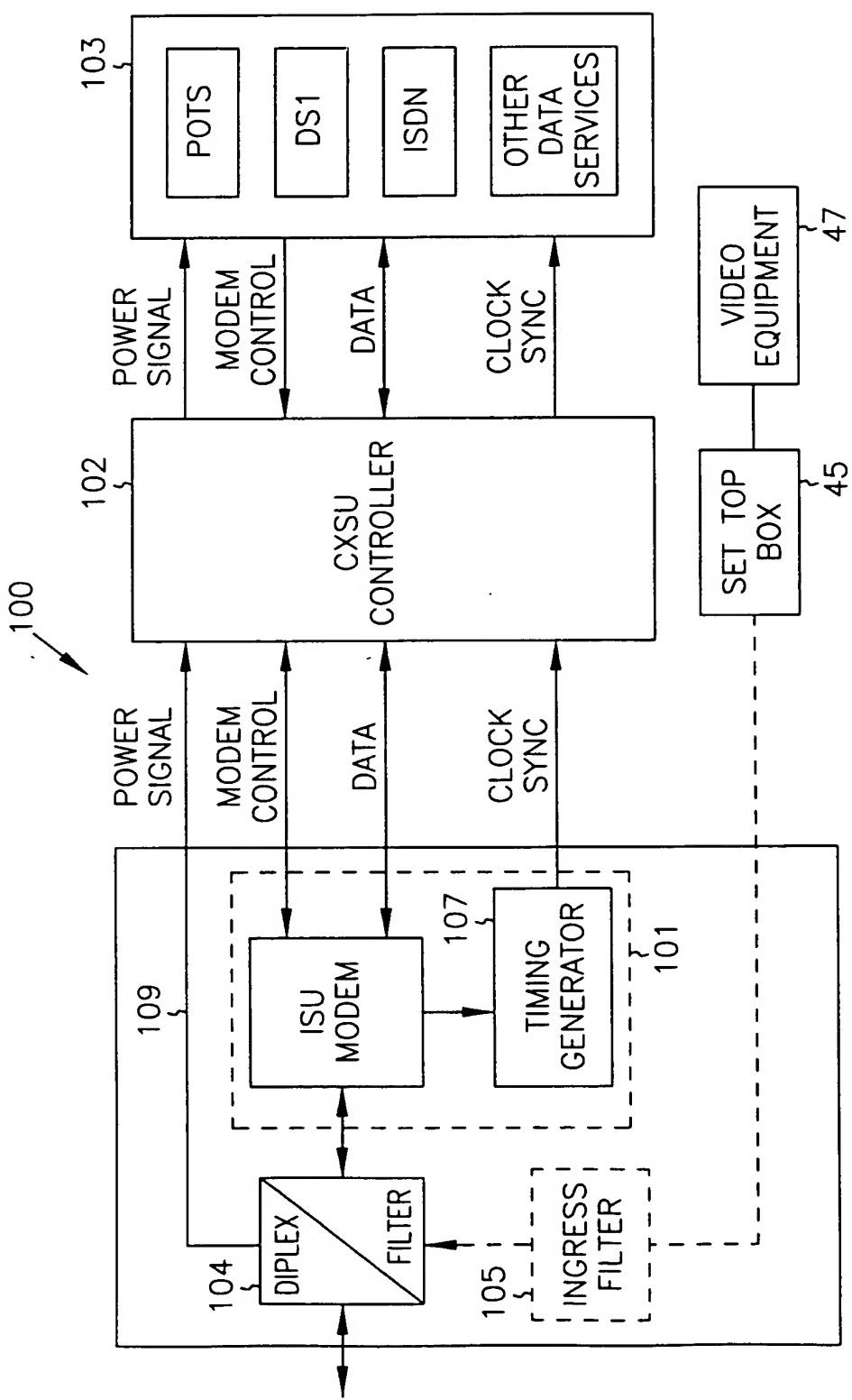
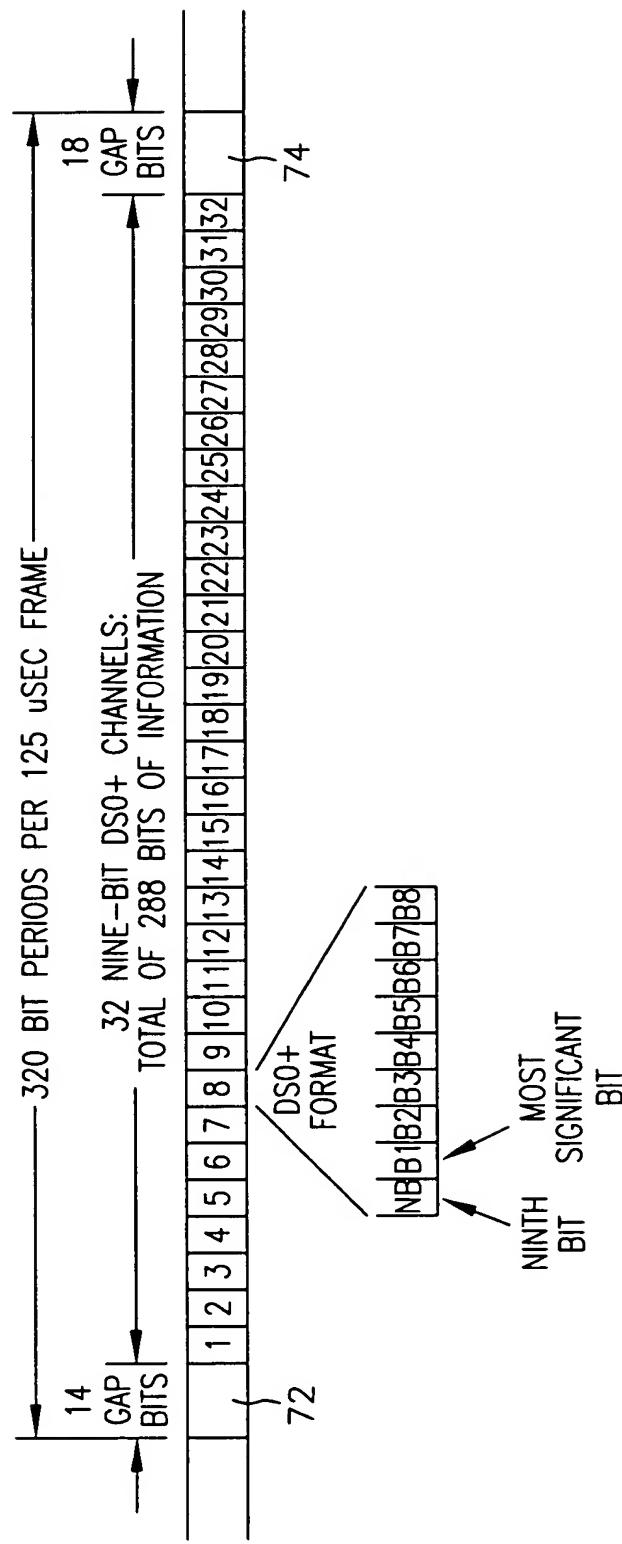


FIG. 8





6
E.G.

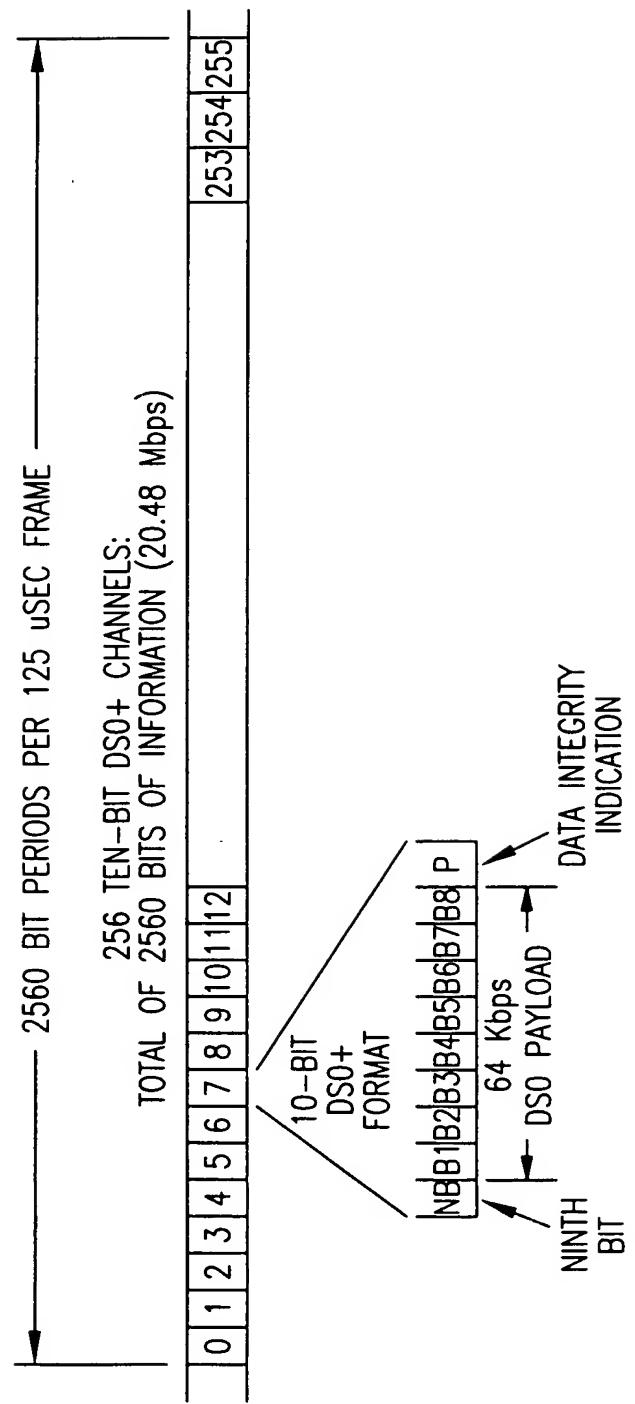


FIG. 10

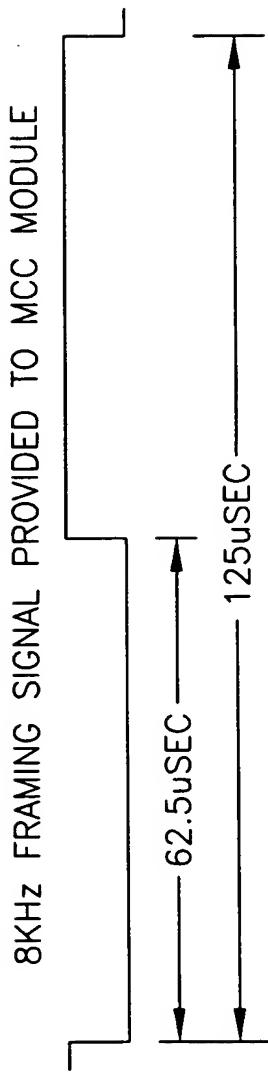


FIG. 11

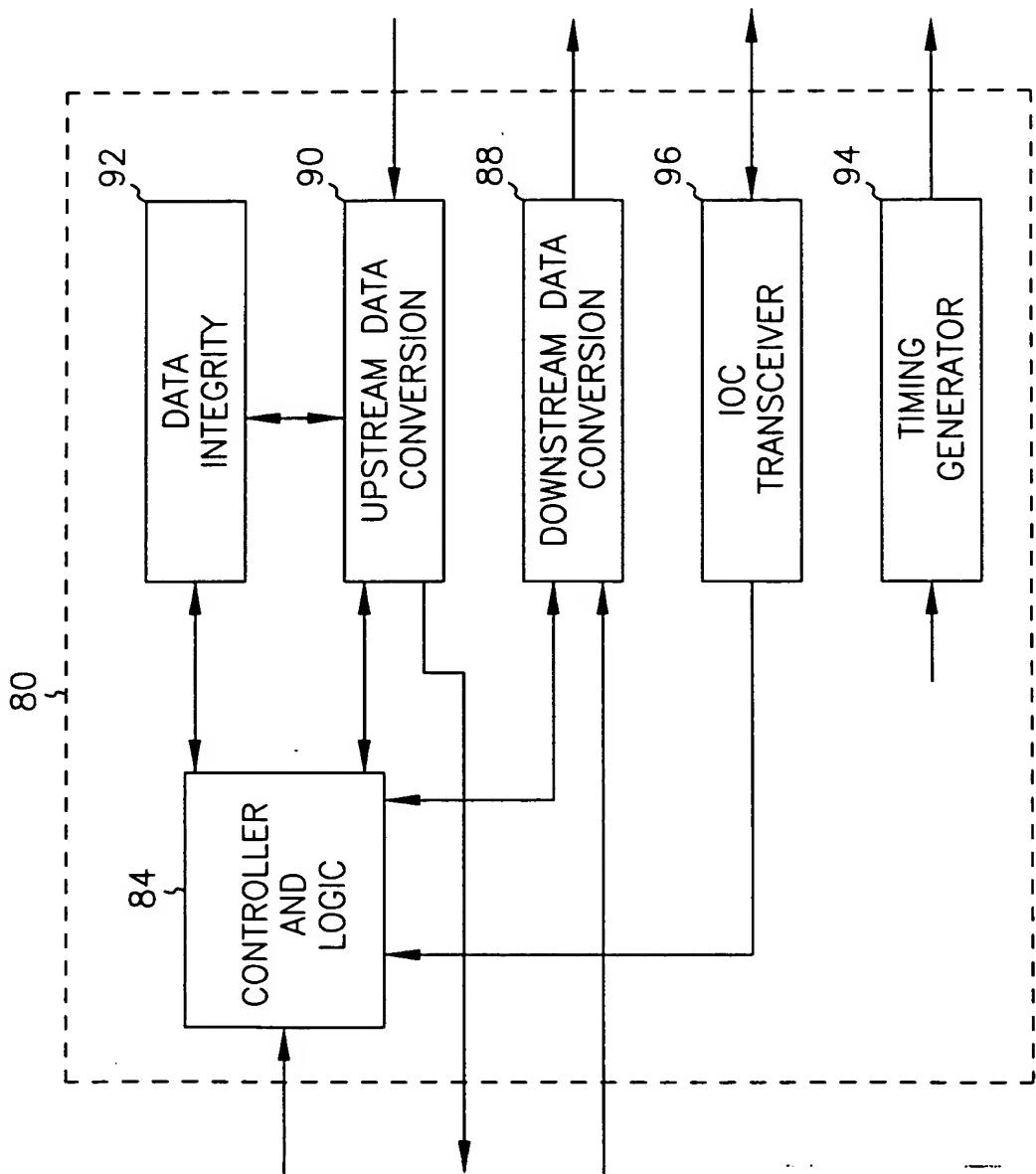


FIG. 12

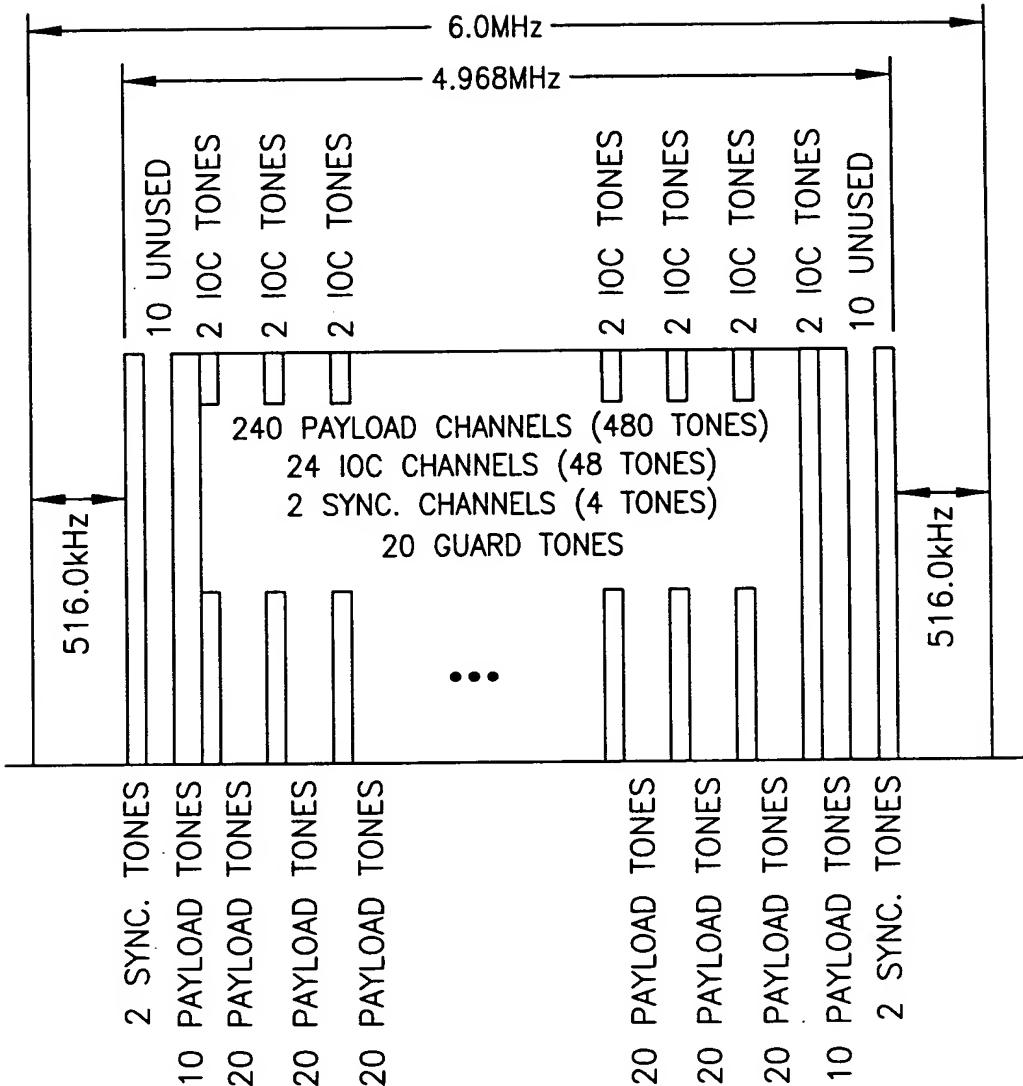


FIG. 13

○ USED IN RECEIVE ONLY • TRANSMIT POINTS

QUADRATURE VALUE 5 (0101)	10000 ○	10000 •	10001 •	10011 •	10010 •	10010 ○
	16	16	17	19	18	18
3 (0011)	10100 •	11000 •	11001 •	11011 •	11010 •	11111 •
	20	24	25	27	26	31
1 (0001)	11100 •	01000 •	01001 •	01011 •	01010 •	11110 •
	28	8	9	11	10	30
-1 (1111)	11101 •	01100 •	01101 •	01111 •	01110 •	10110 •
	29	12	13	15	14	22
-3 (1101)	10101 •	00100 •	00101 •	00111 •	00110 •	10111 •
	21	4	5	7	6	23
-5 (1011)	00000 ○	00000 •	00001 •	00011 •	00010 •	00010 ○
	0	0	1	3	2	2
	-5 (1011)	-3 (1101)	-1 (1111)	1 (0001)	3 (0011)	5 (0101)
	INPHASE VALUE					

FIG. 14

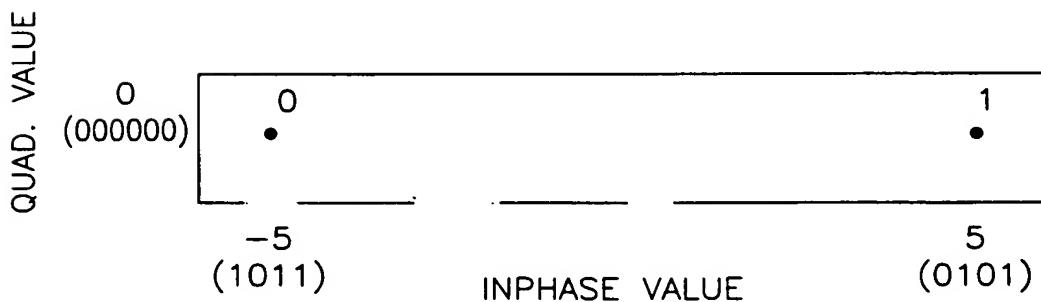


FIG. 15

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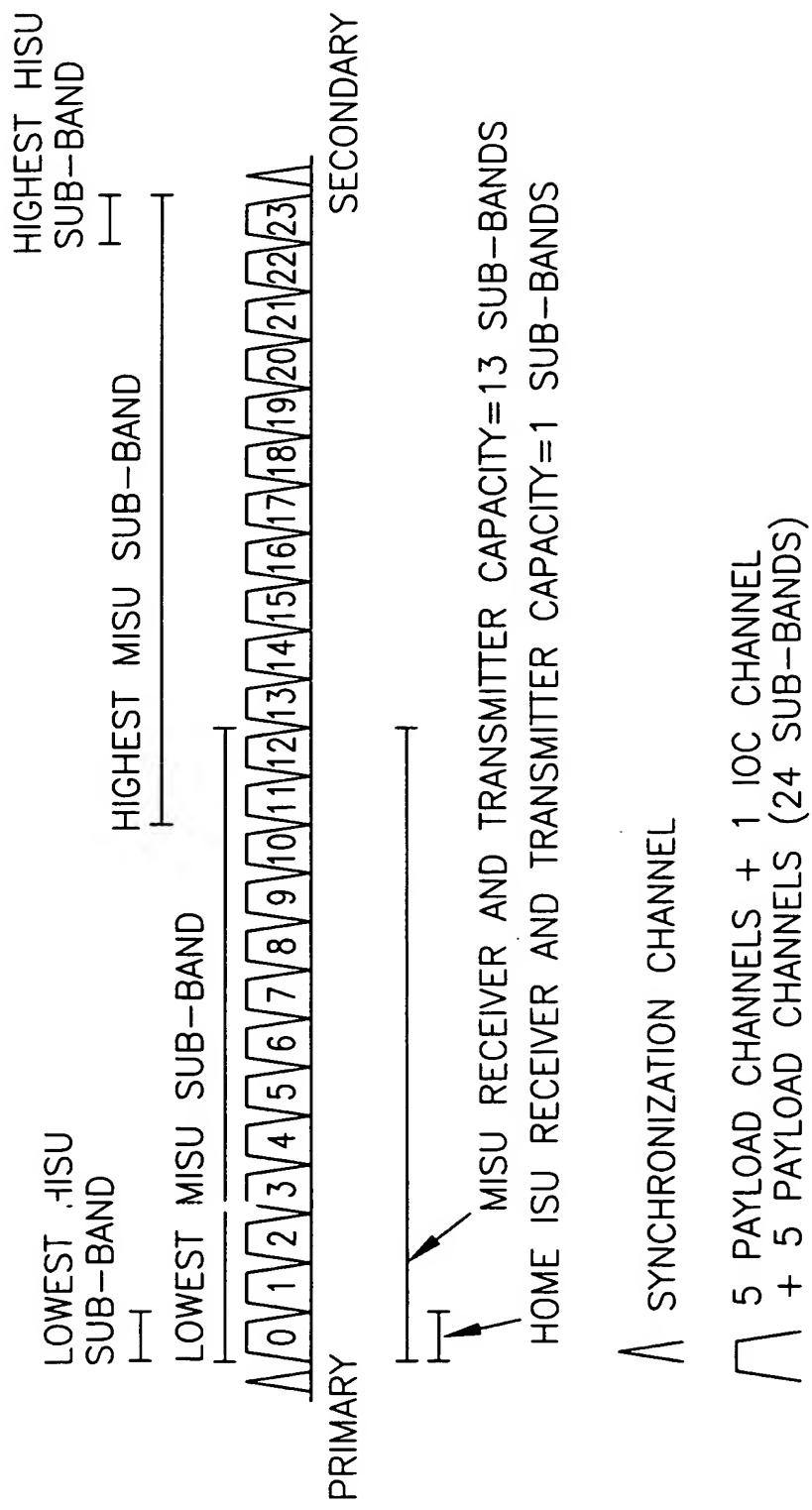


FIG. 16

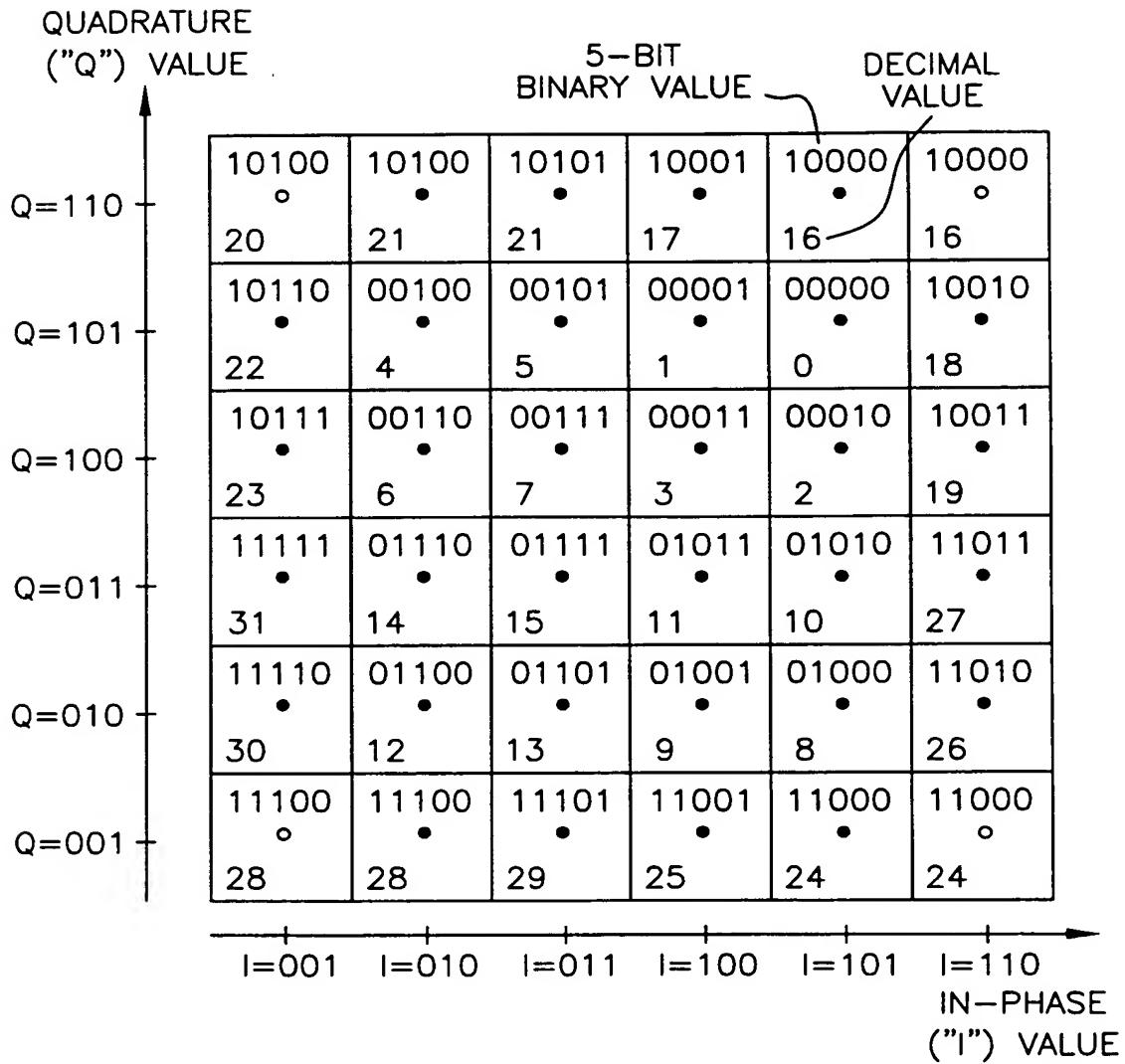


FIG. 17

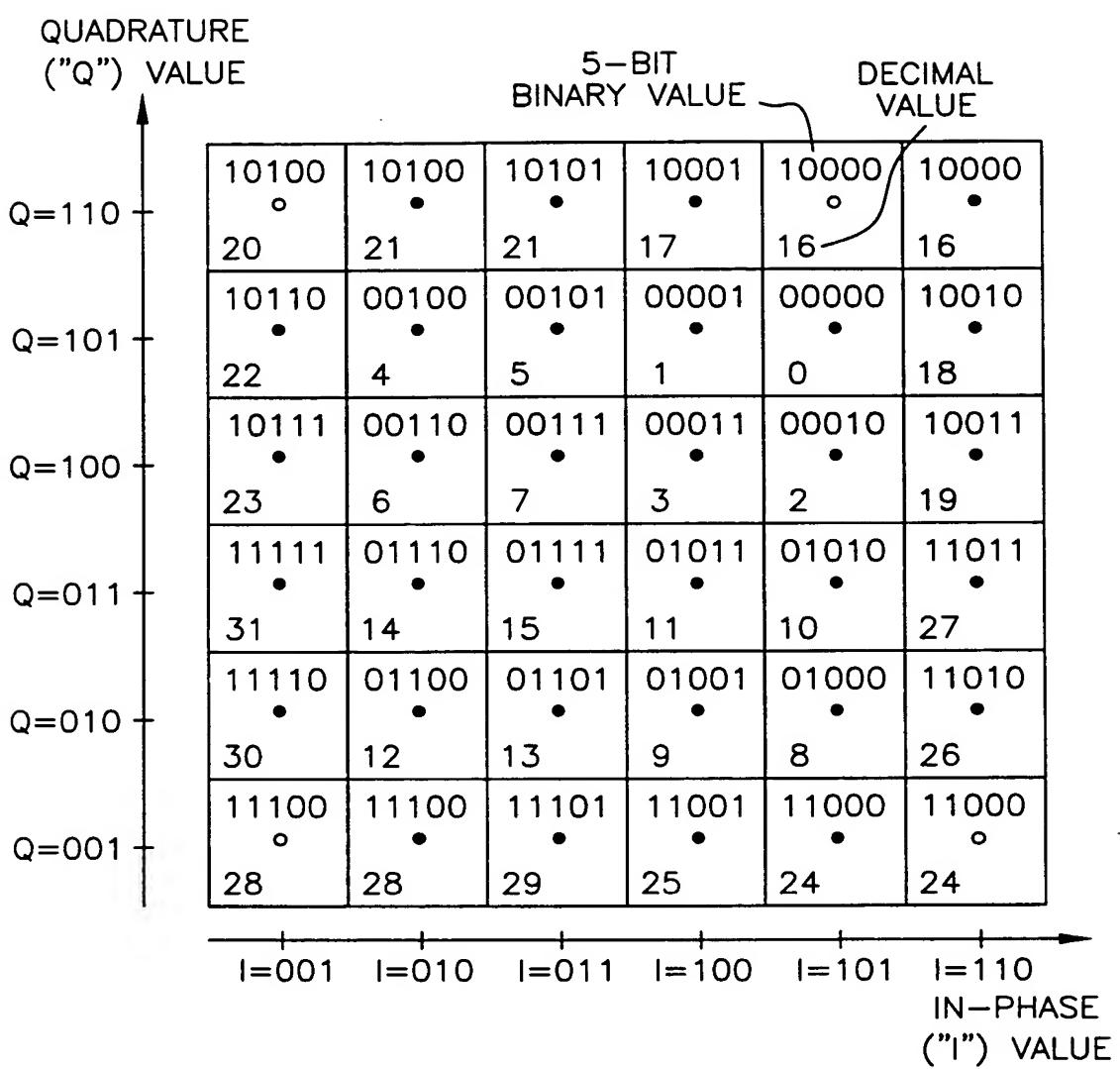
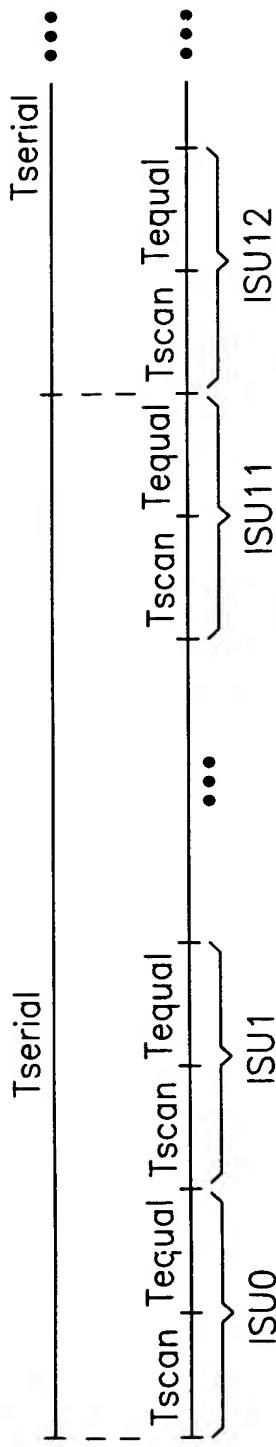


FIG. 18



19
FIG.

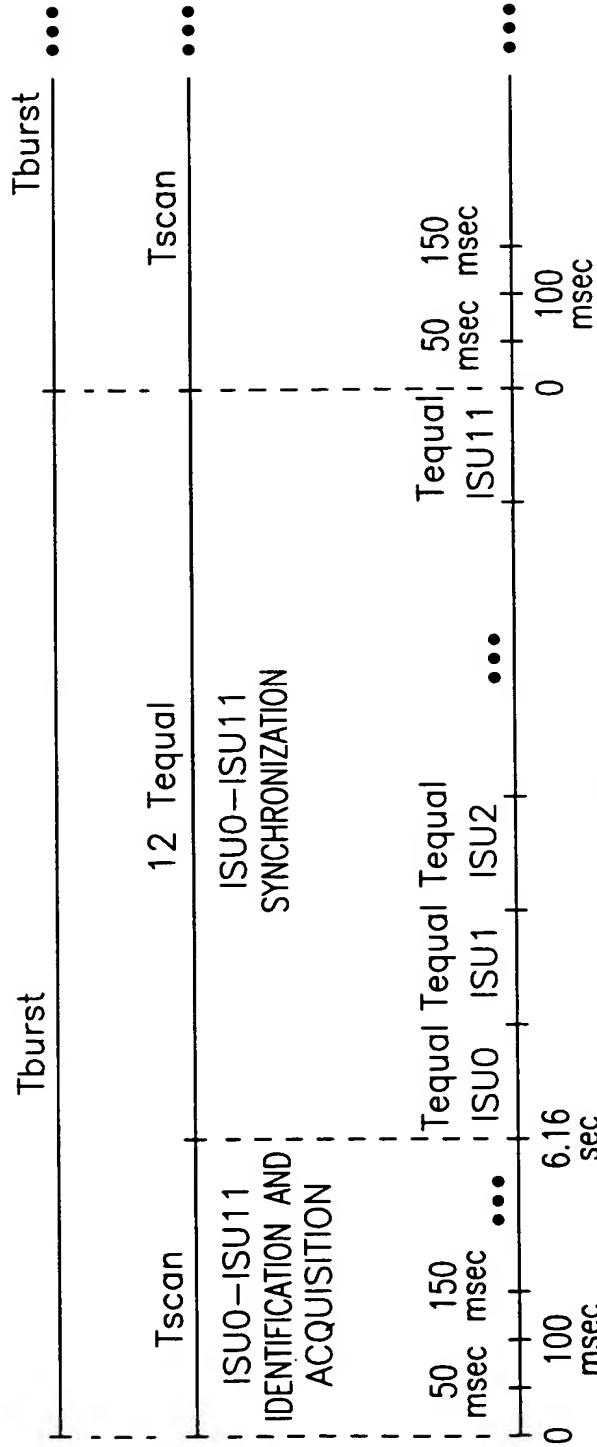


FIG. 20

FIG. 21

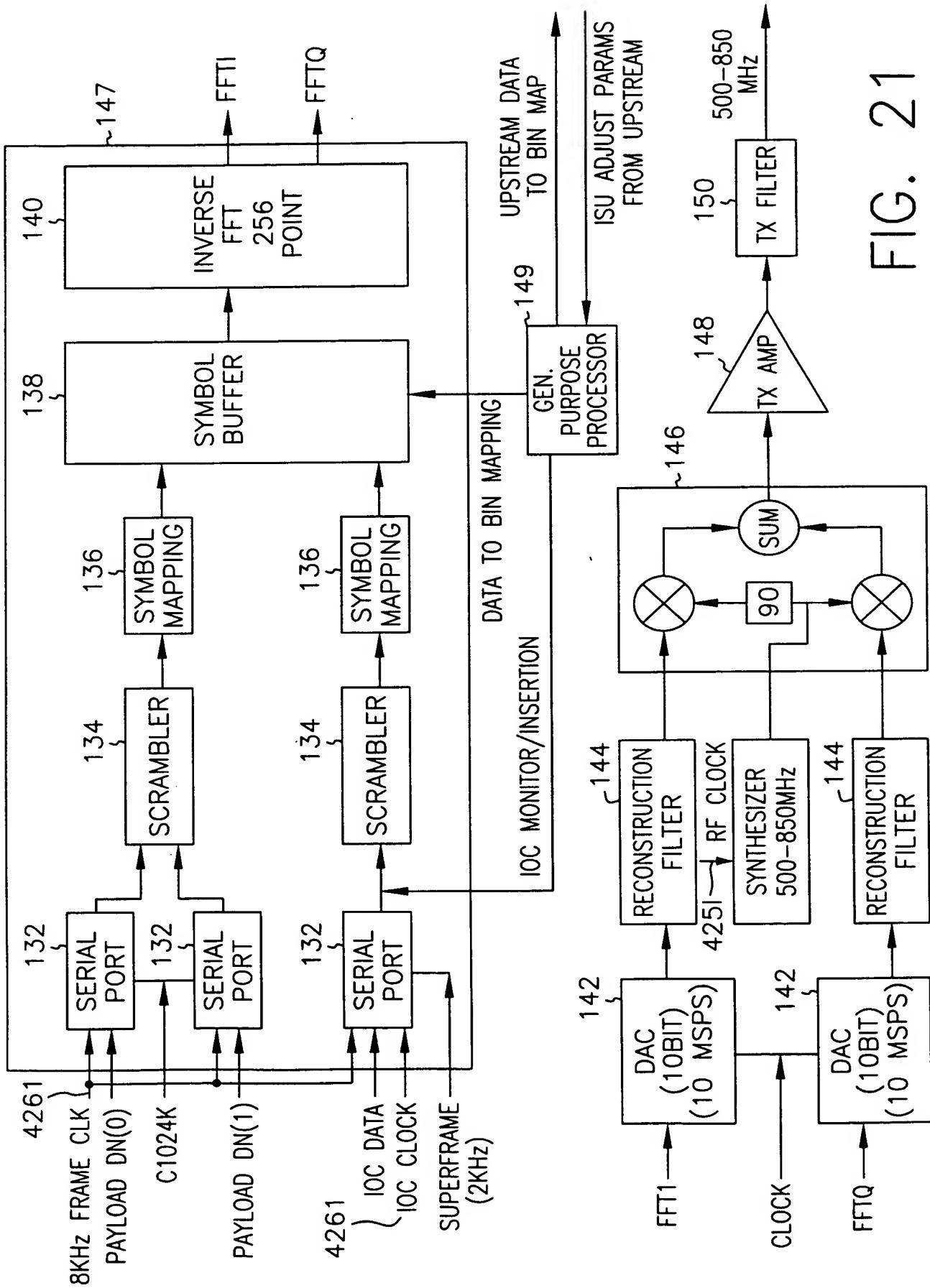


FIG. 22

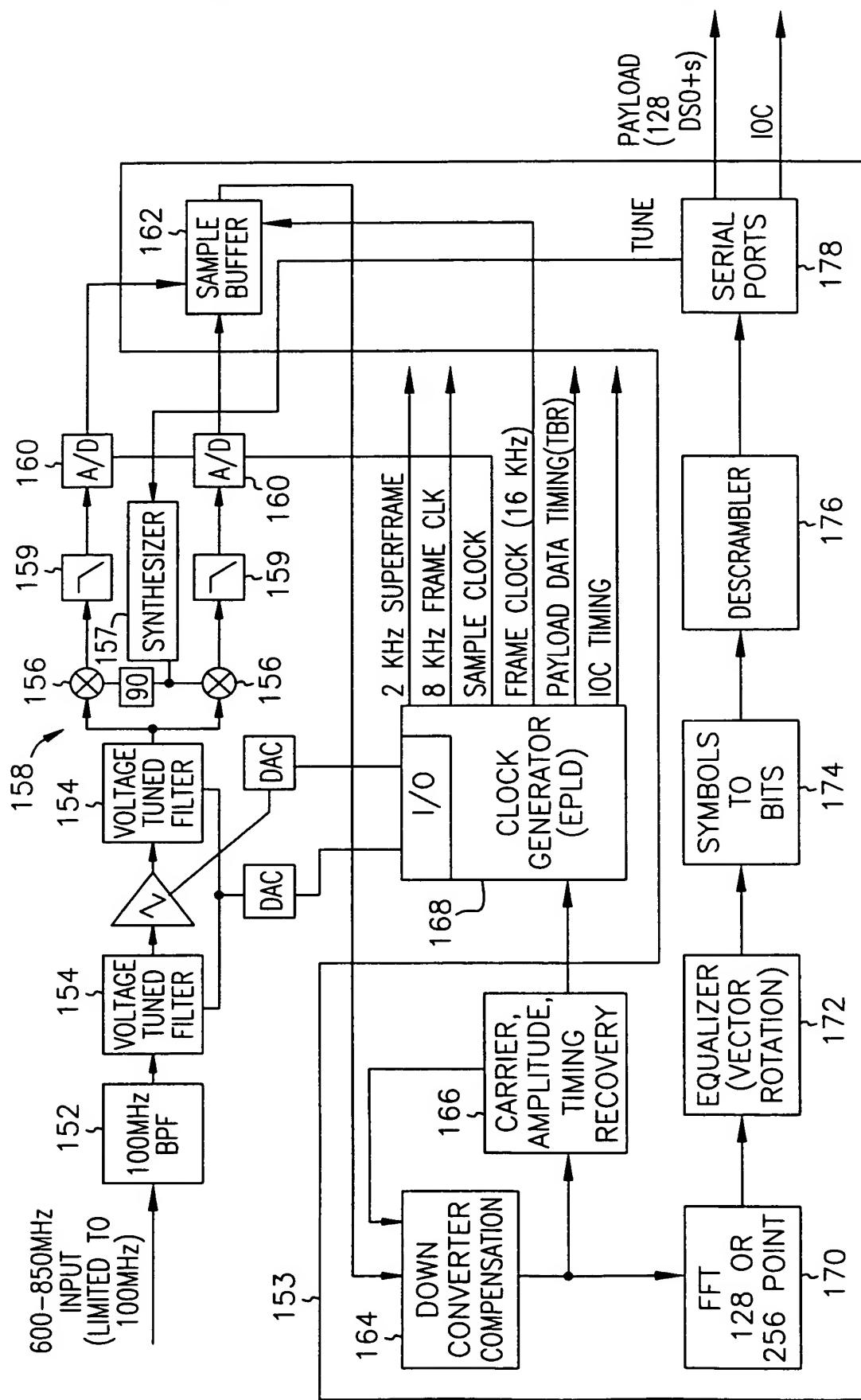
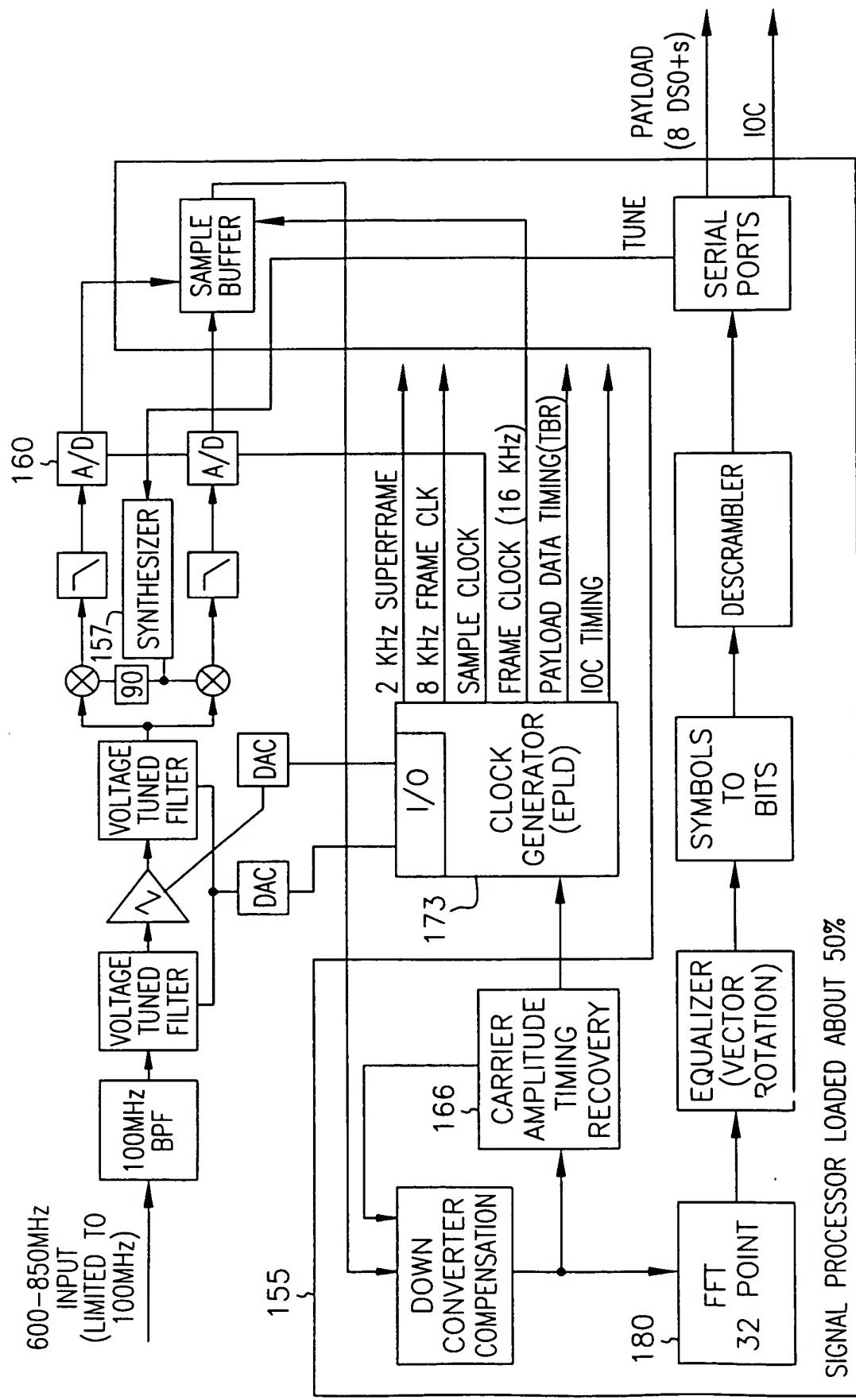


FIG. 23



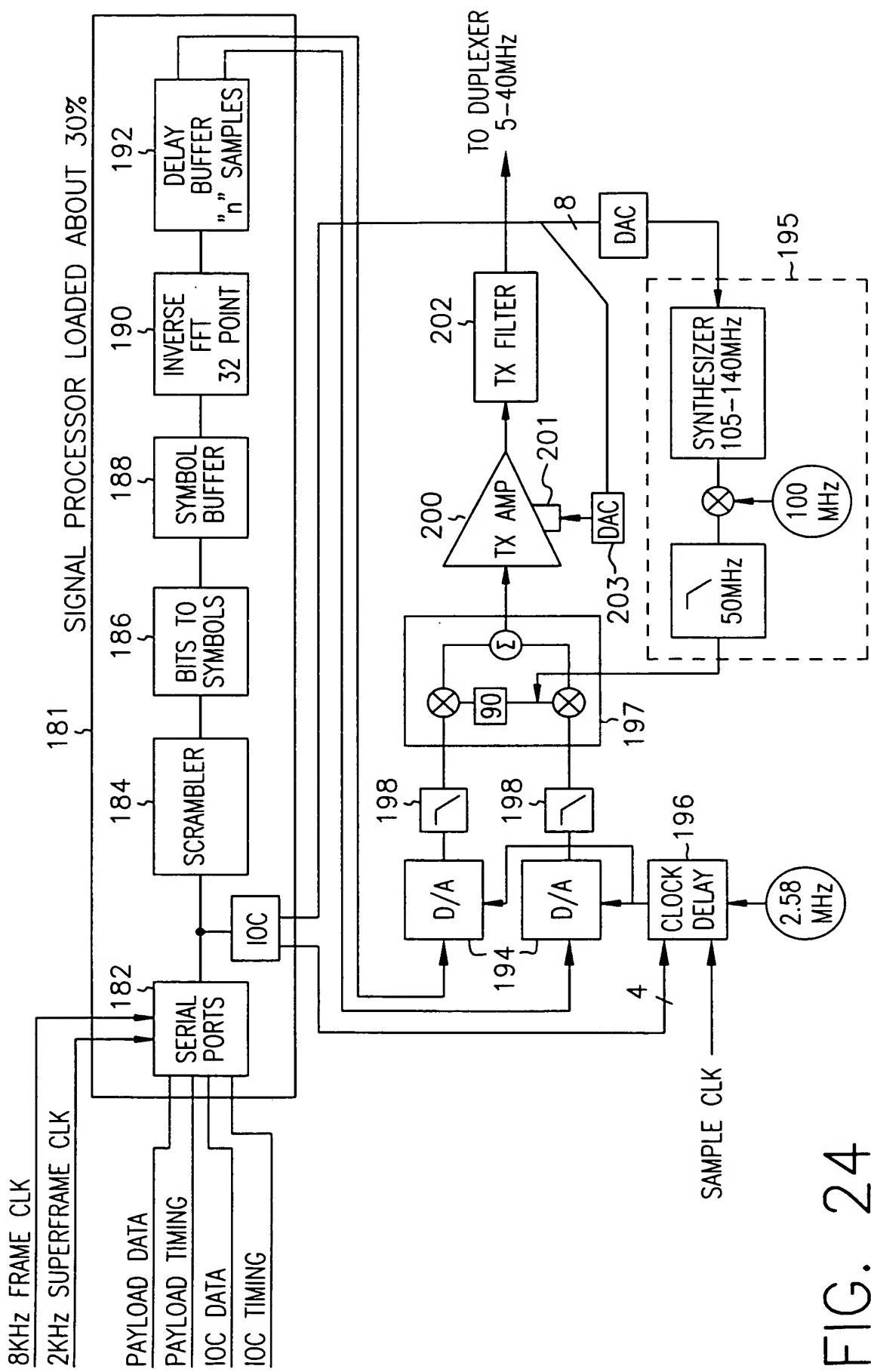


FIG. 24

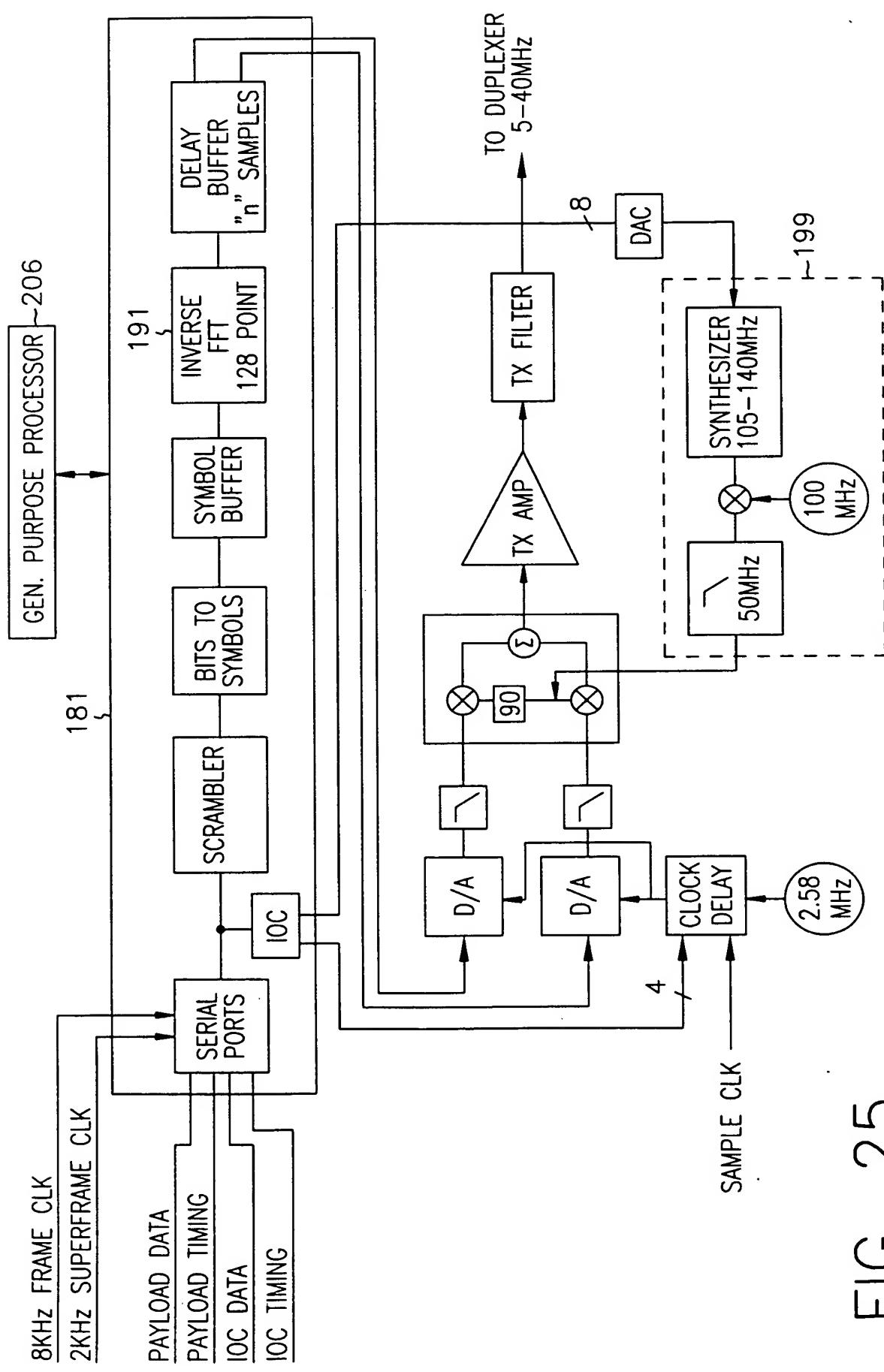


FIG. 25

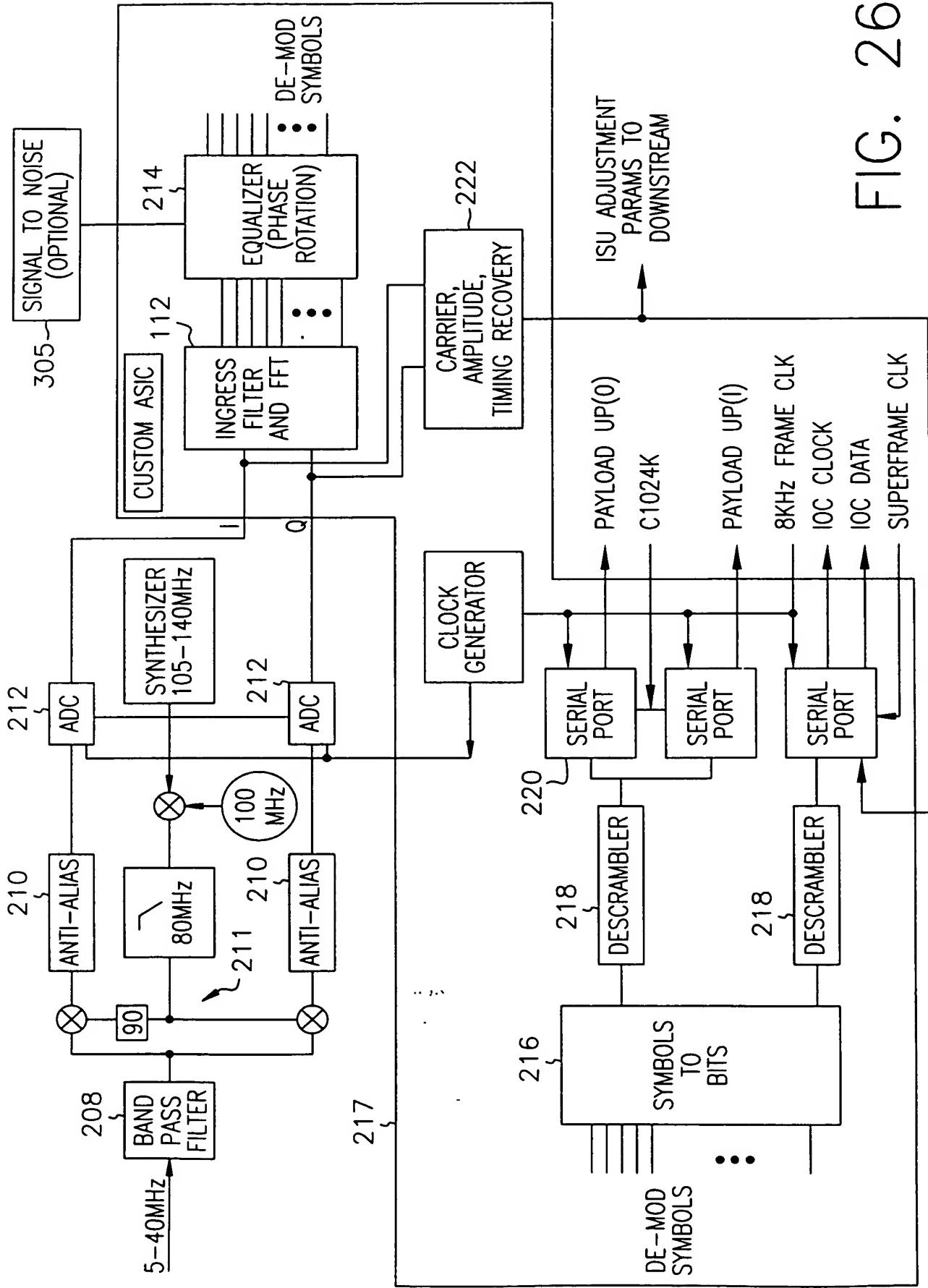


FIG. 26

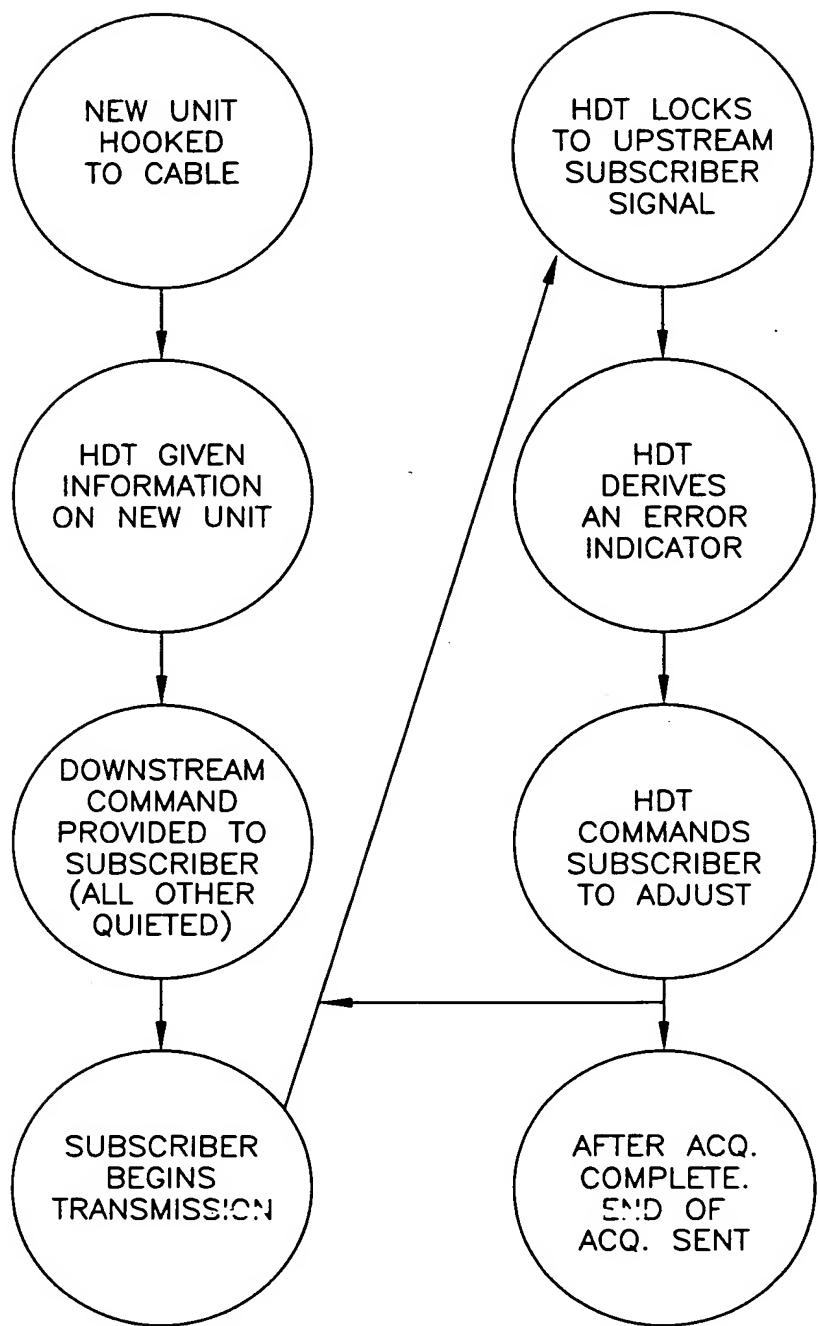


FIG. 27

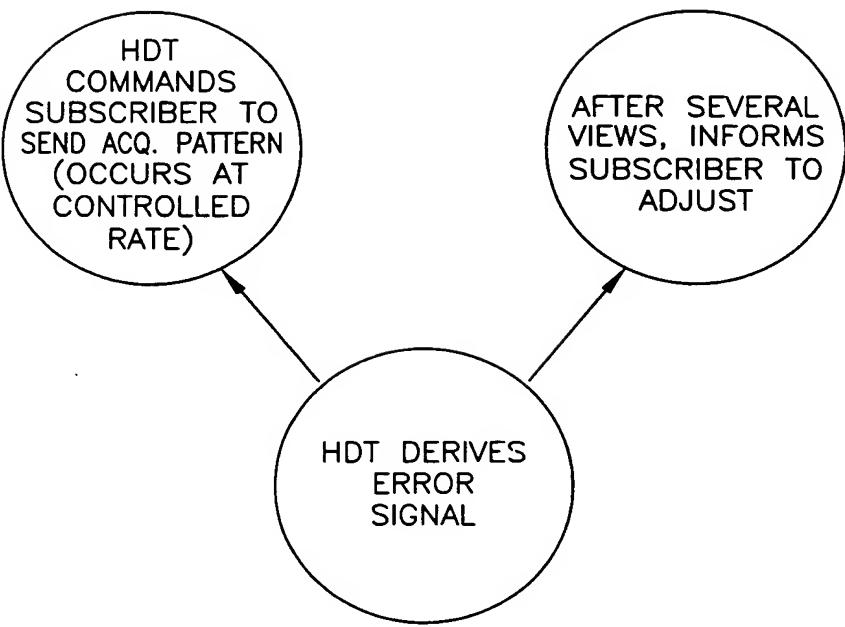


FIG. 28

Magnitude response of a single polyphase filter bank

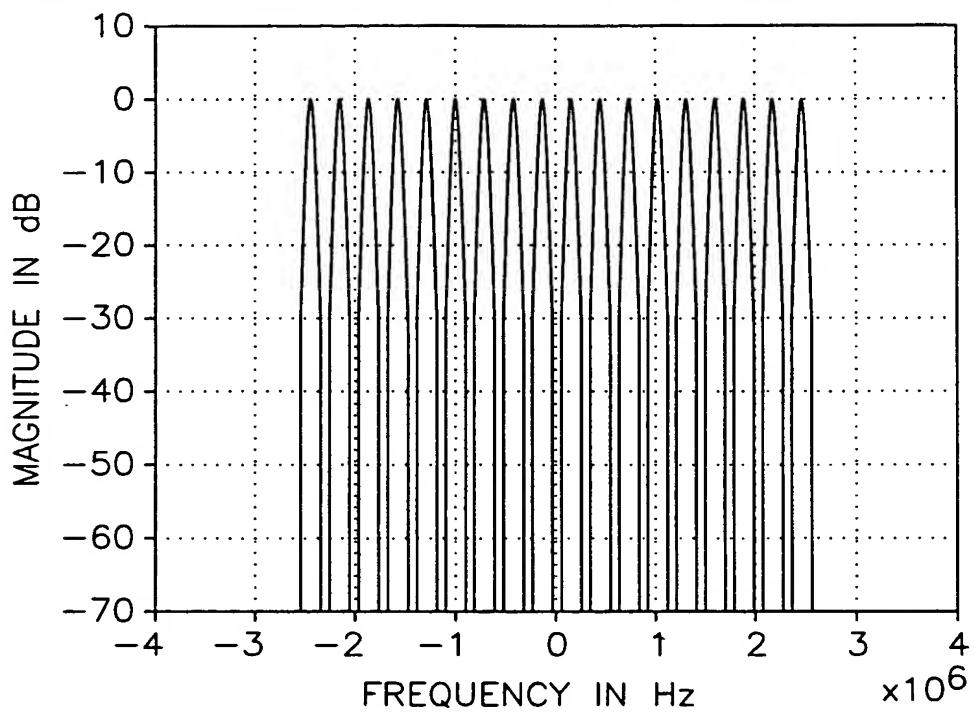


FIG. 29

Magnitude response of a single polyphase filter bank

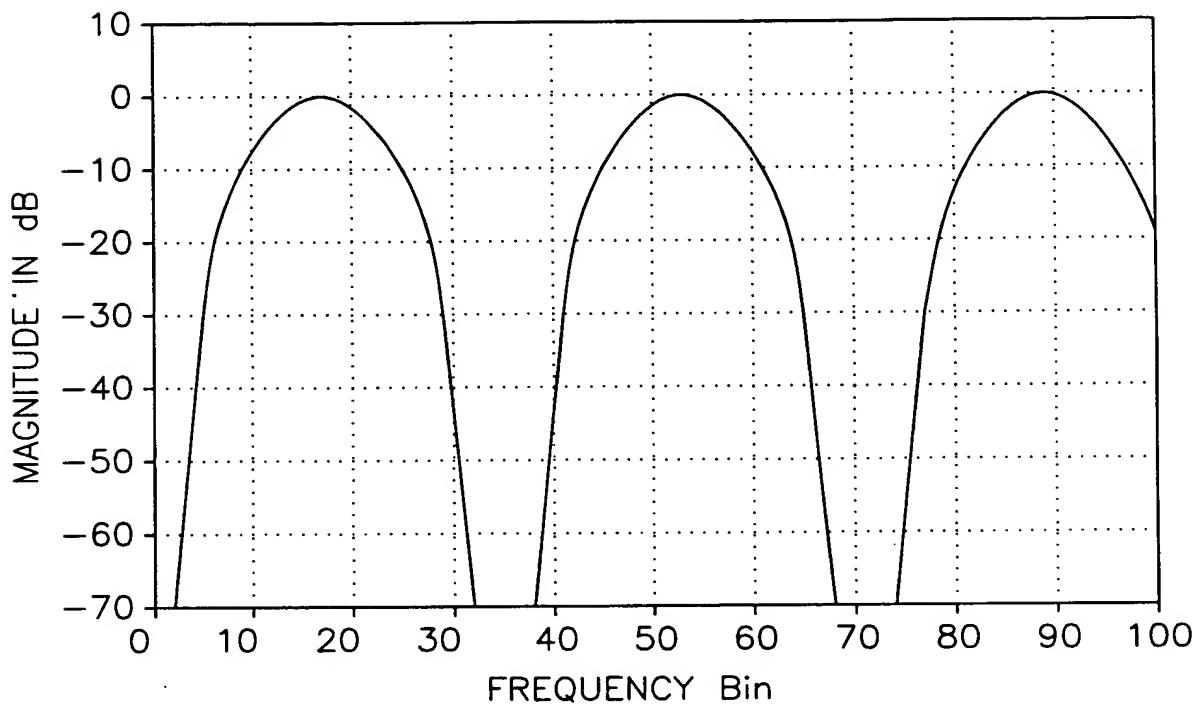


FIG. 30

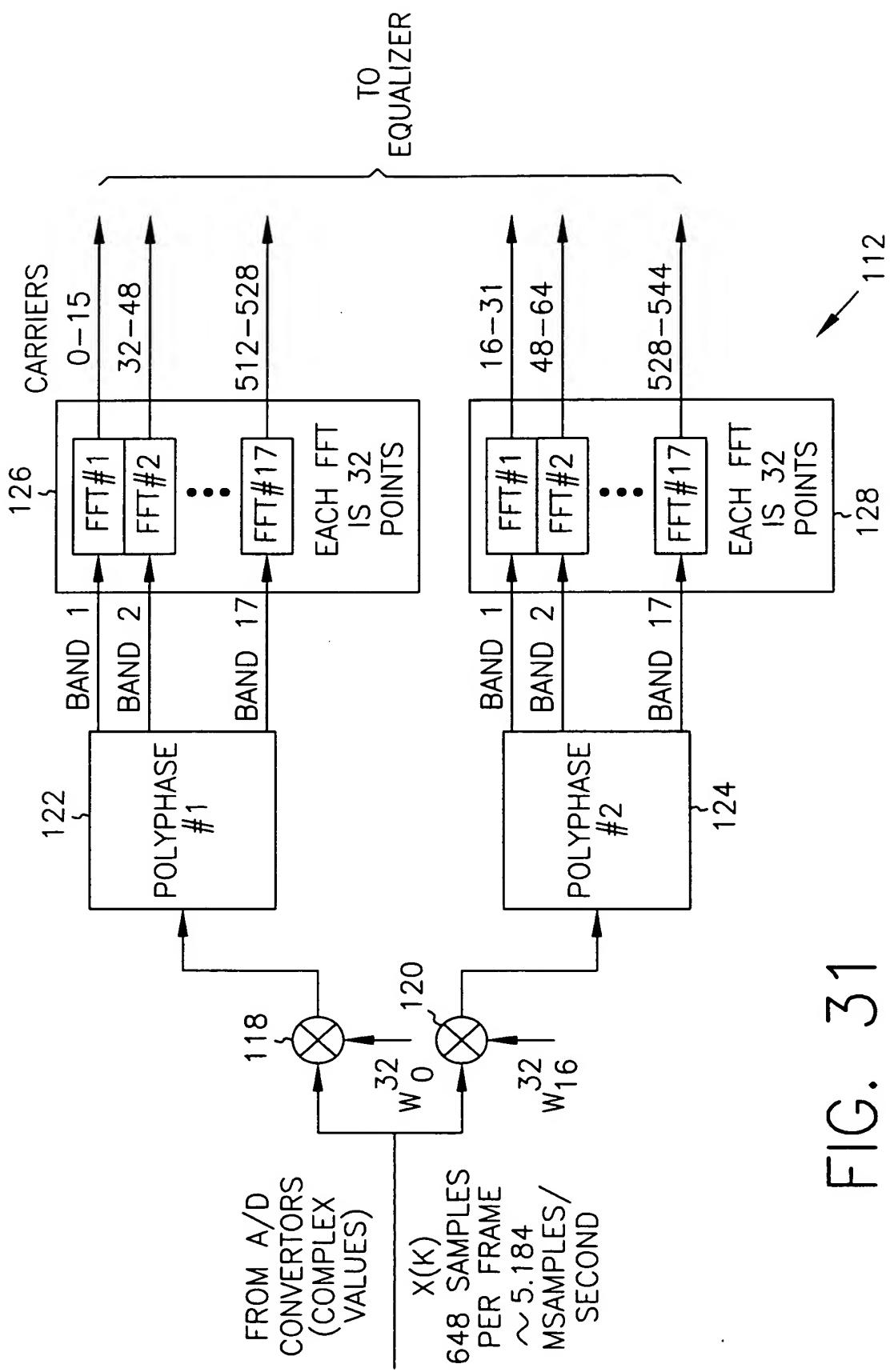


FIG. 31

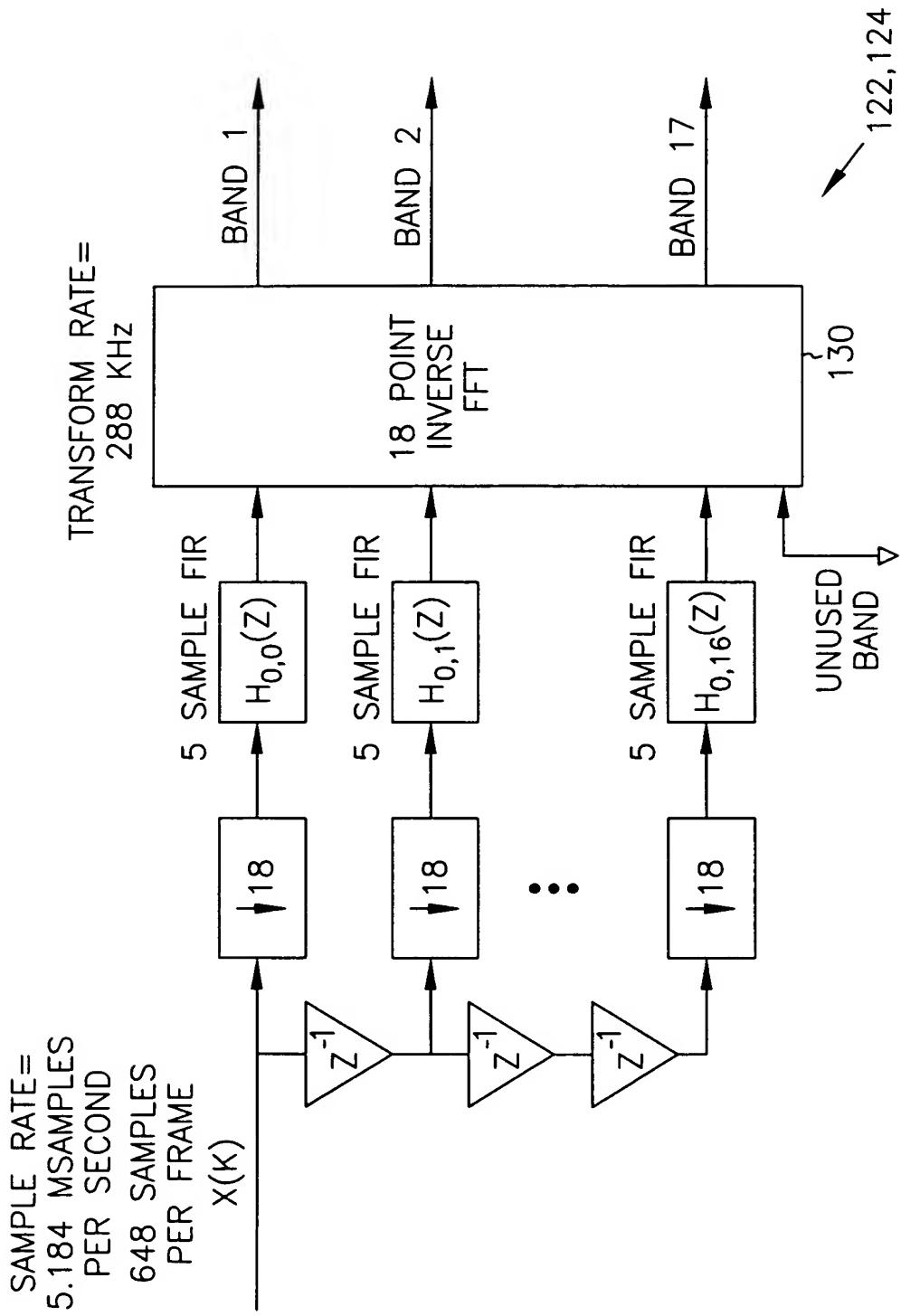


FIG. 32

FIG. 33

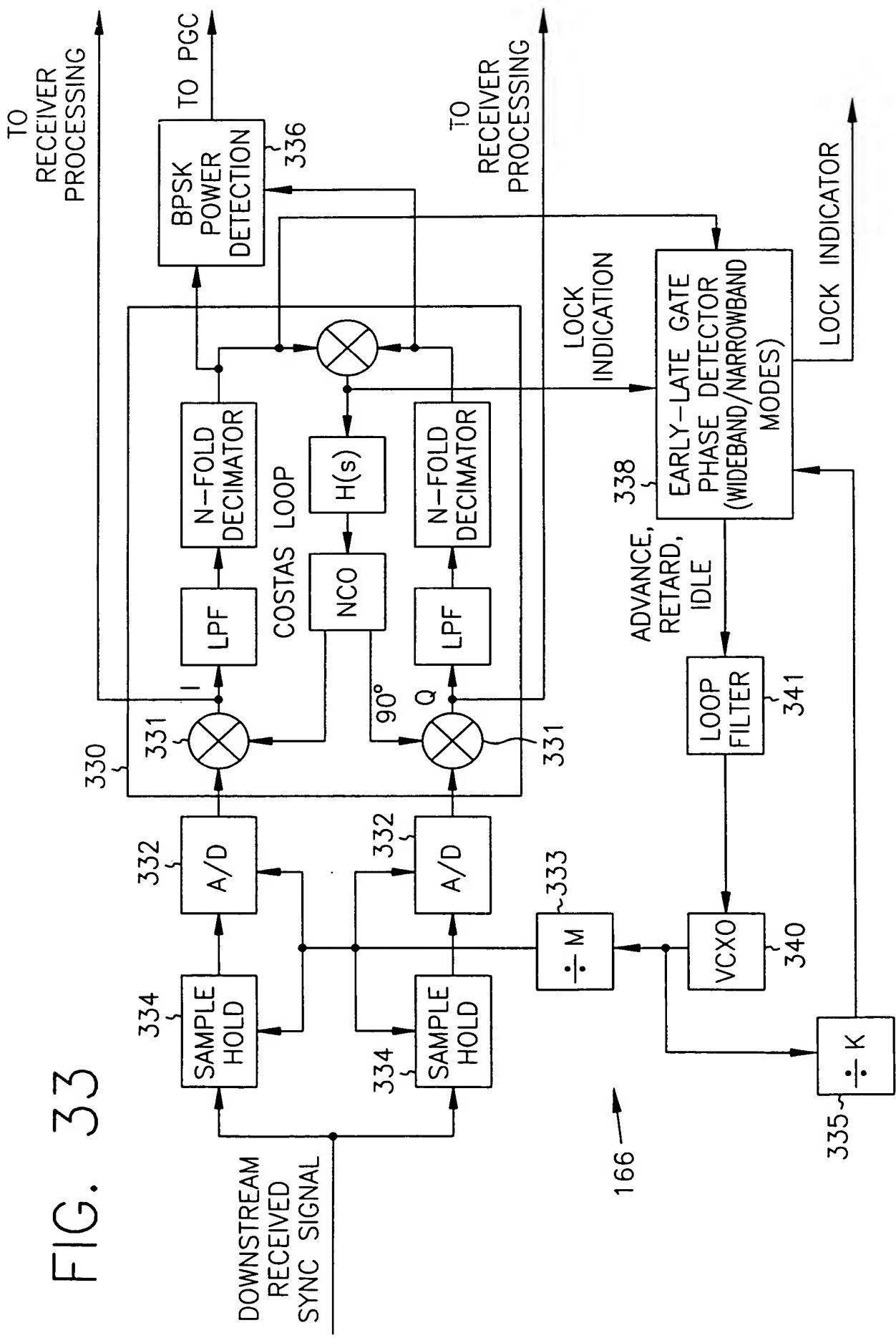


FIG. 34

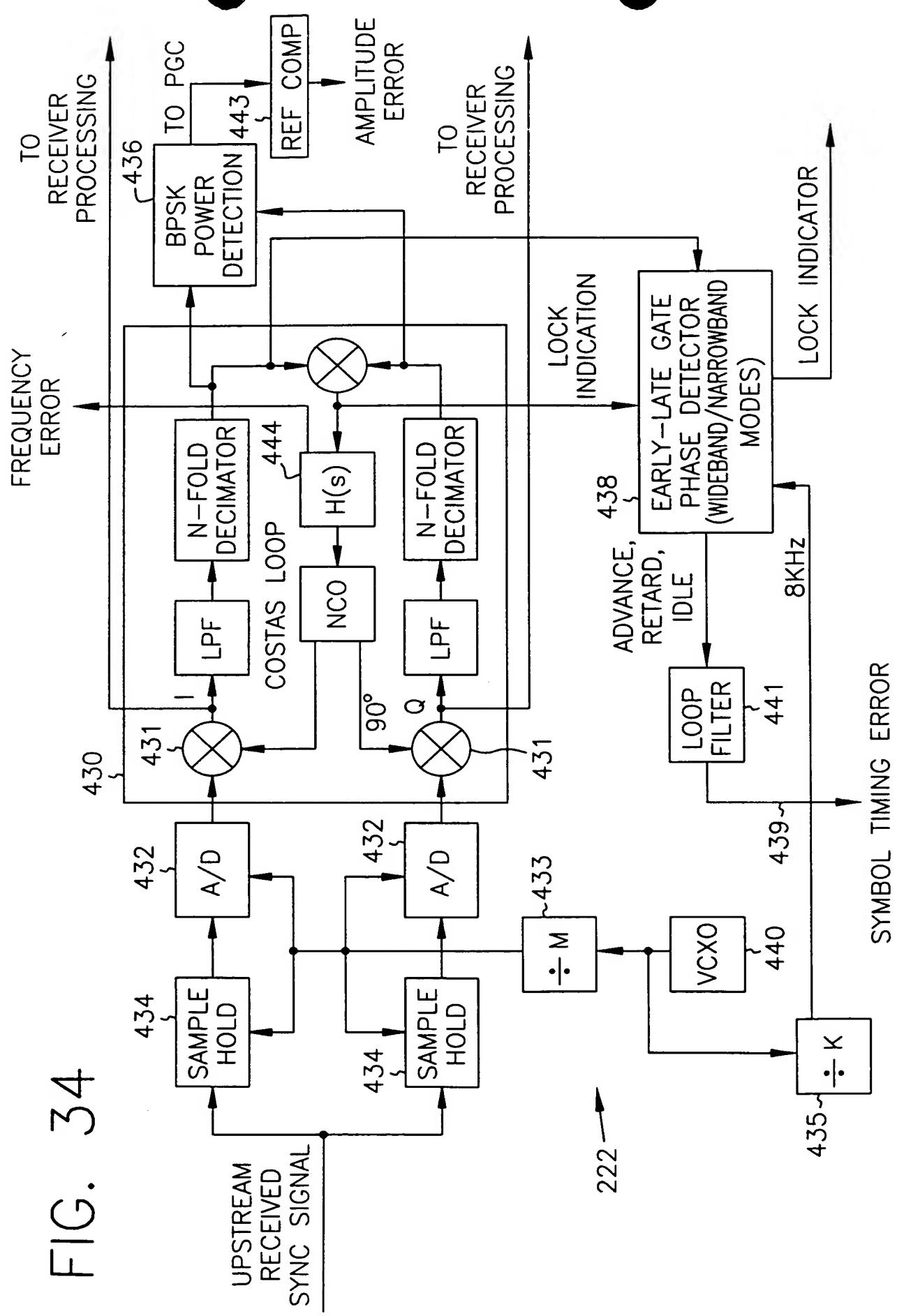
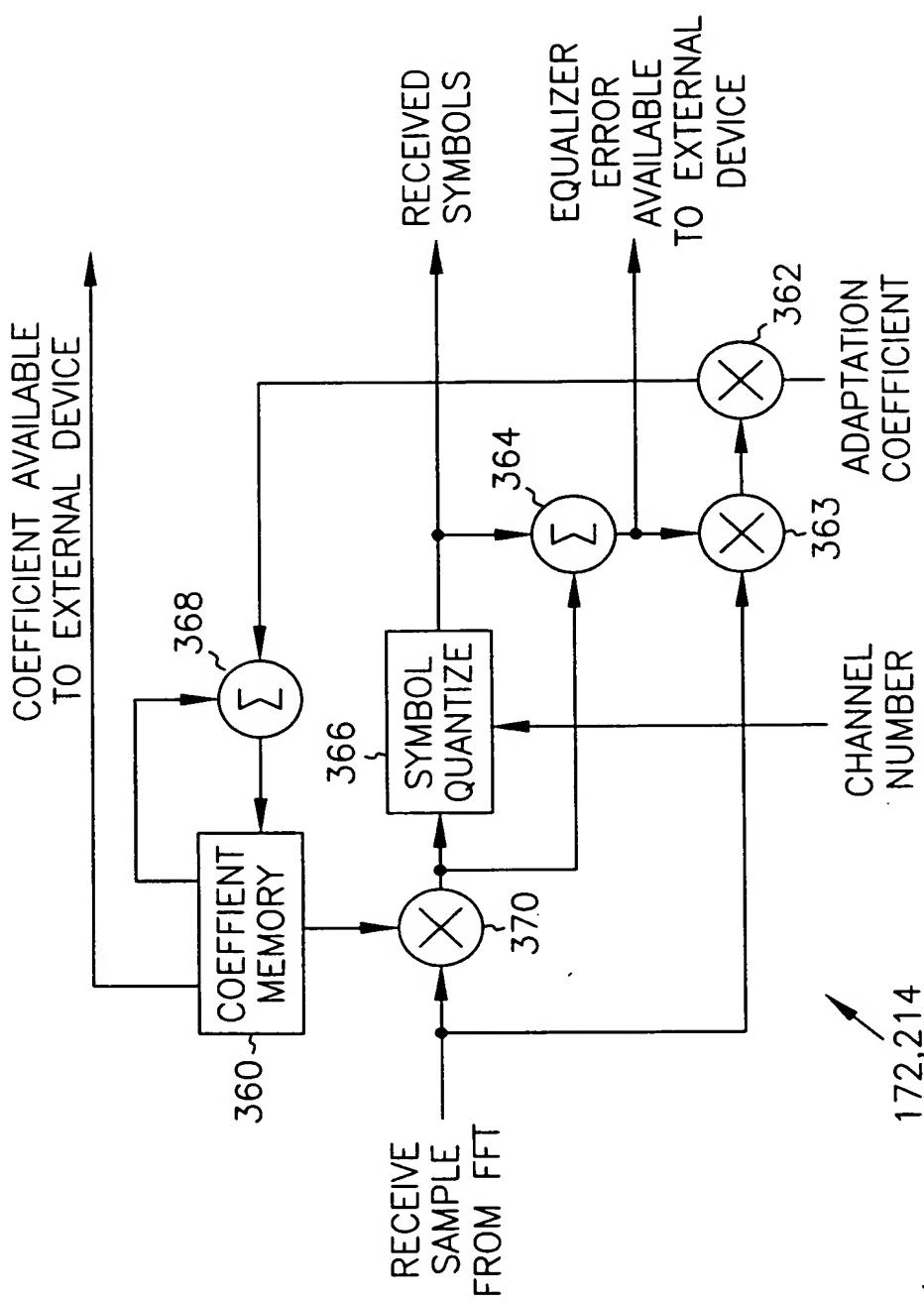


FIG. 35



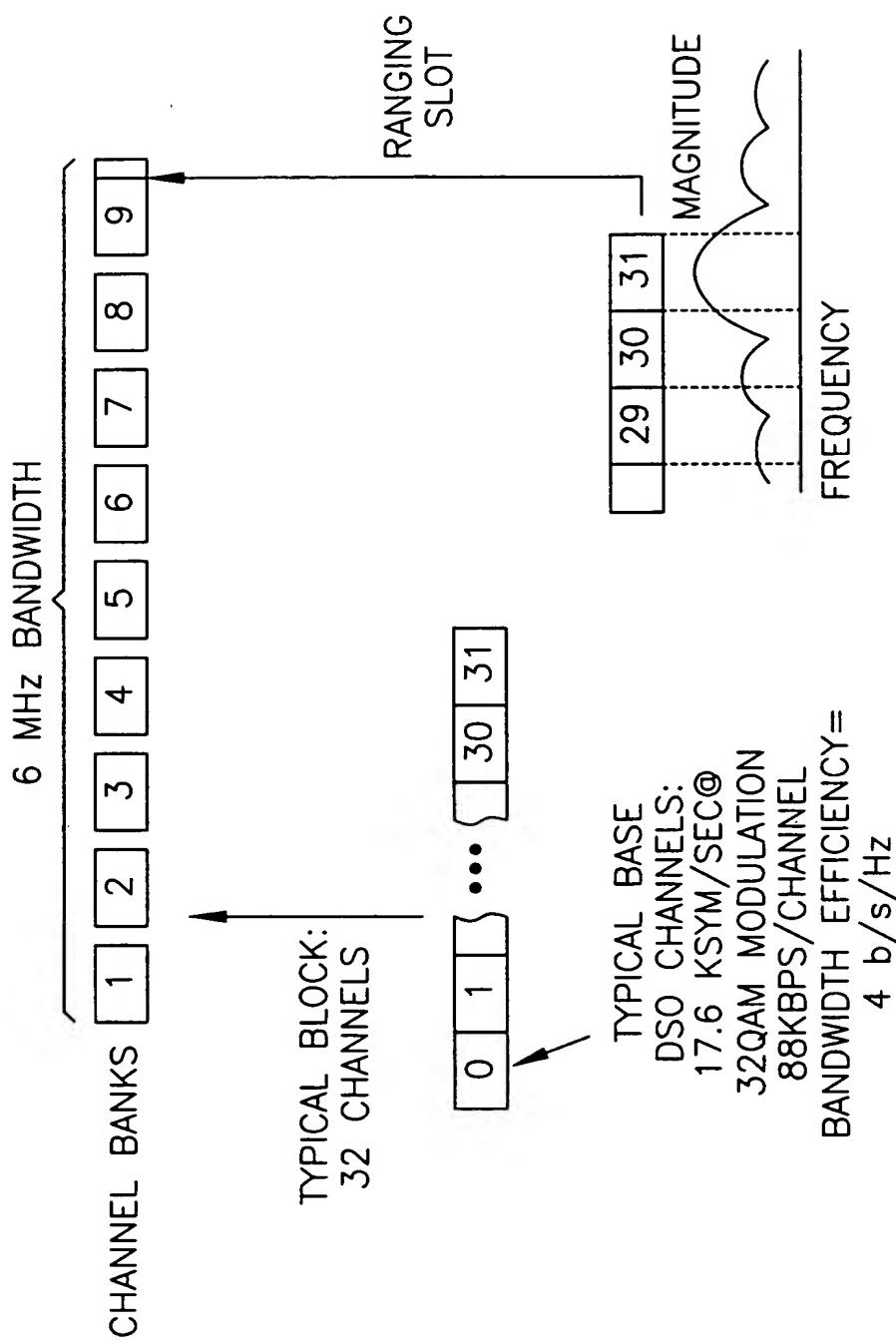


FIG. 36

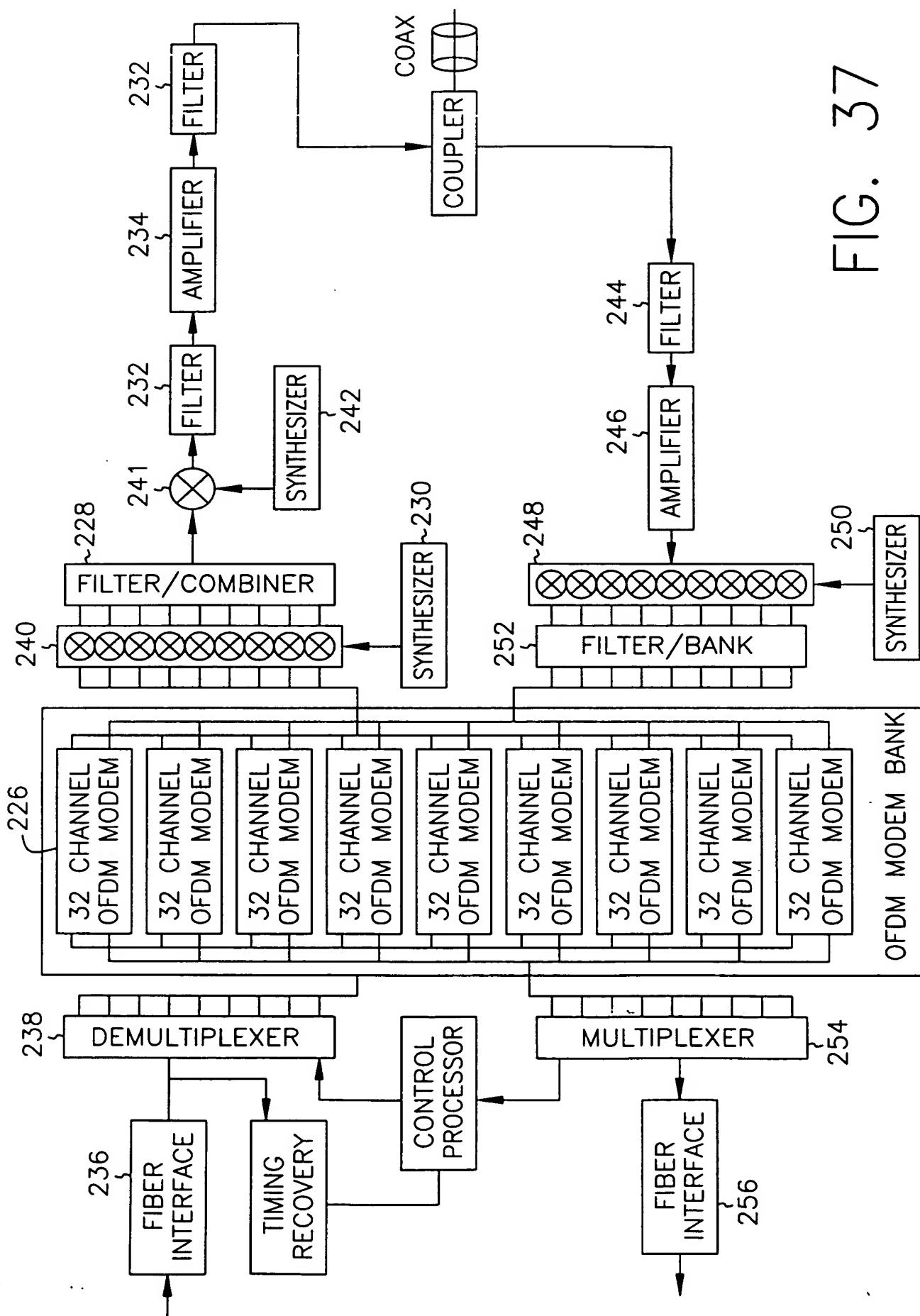


FIG. 37

224
RECEIVED OFDM

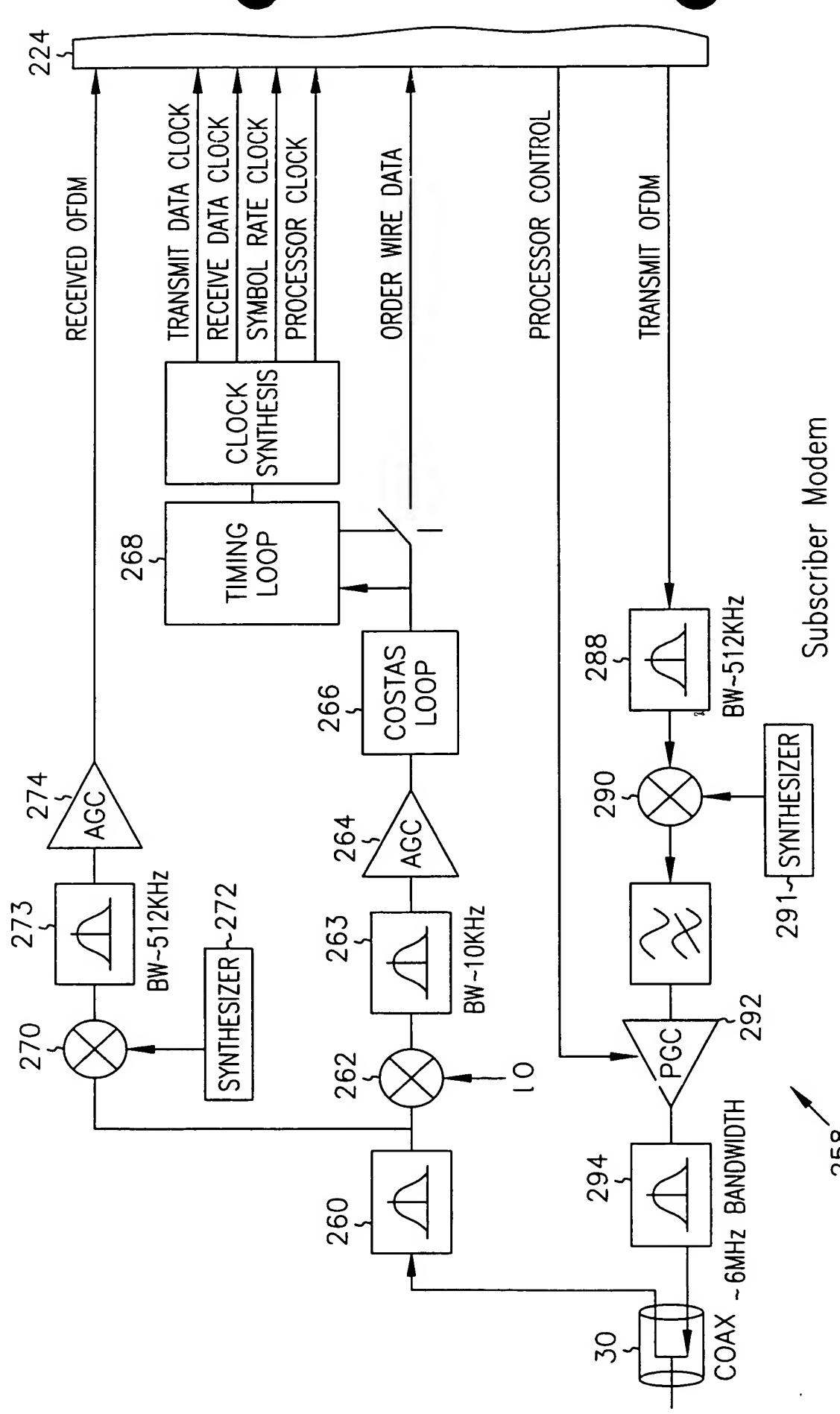


FIG. 38

32 CHANNEL OFDM MODEM

224
225

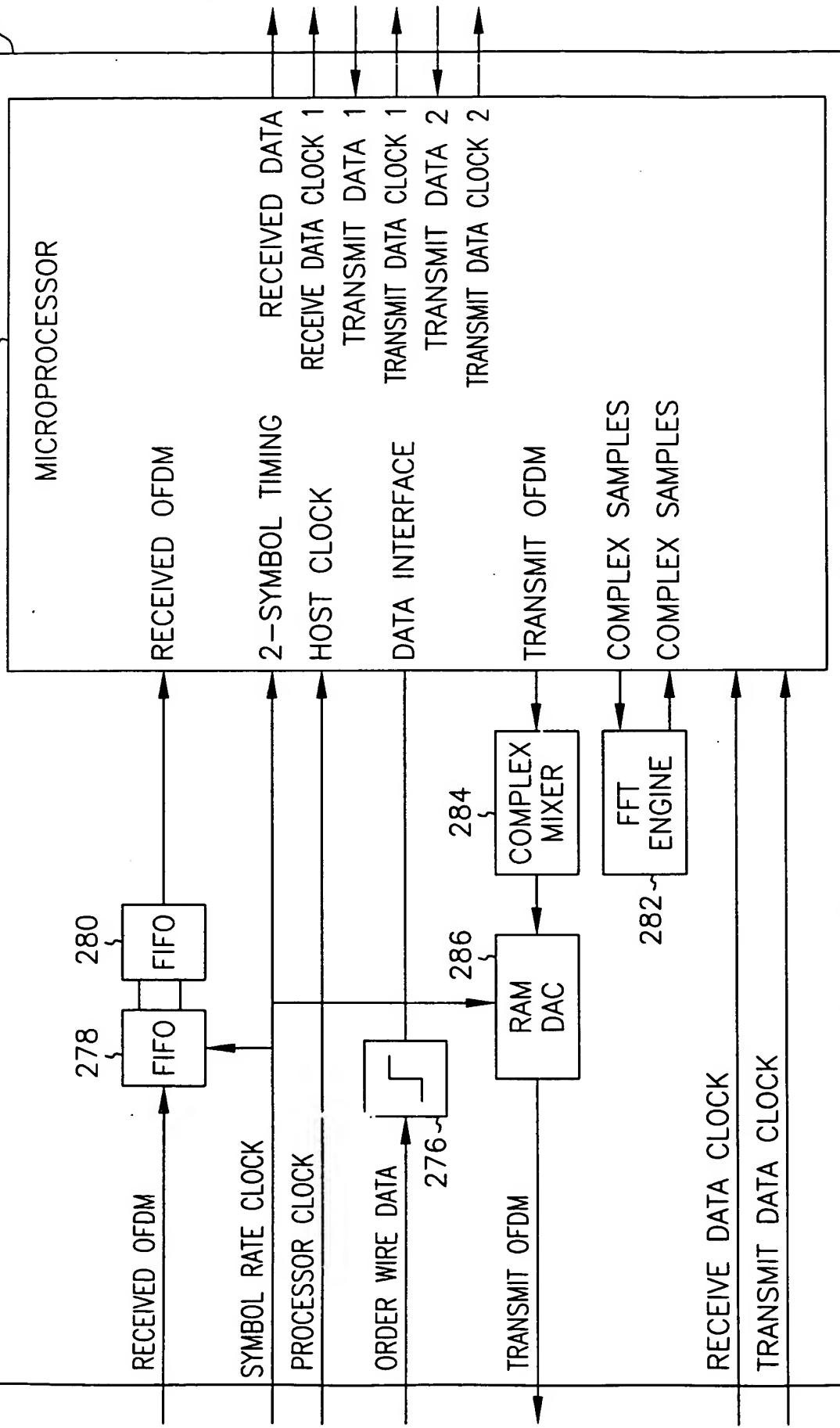


FIG. 39

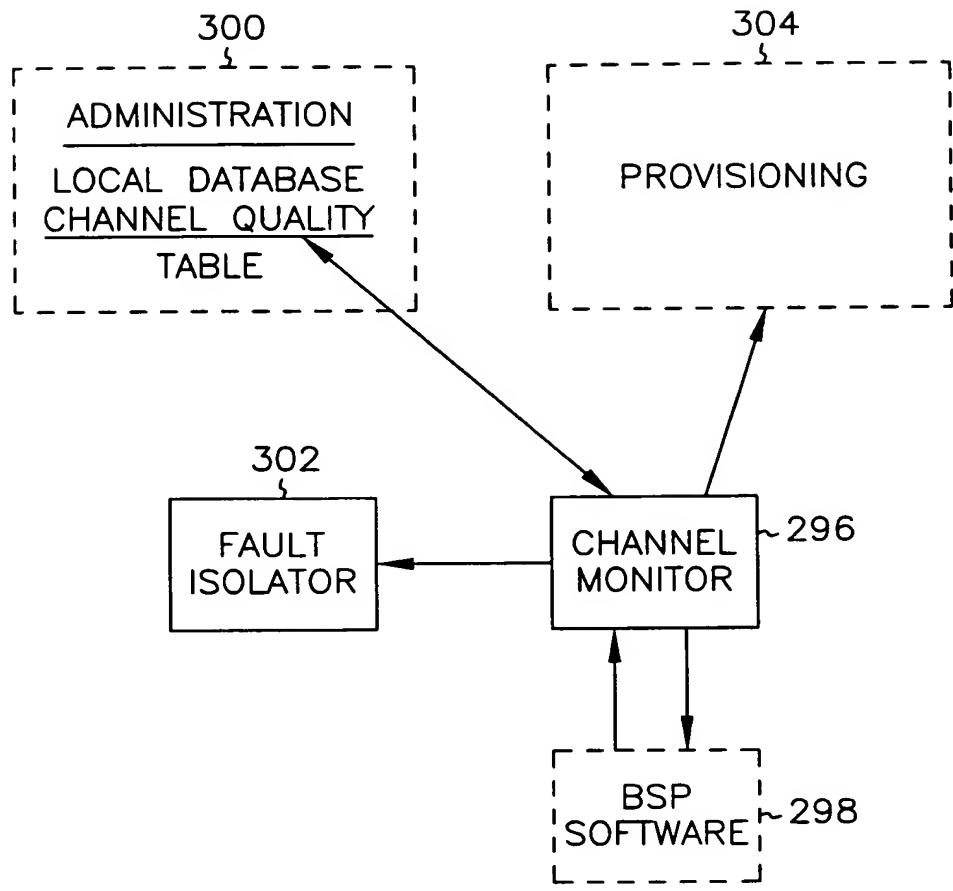


FIG. 40

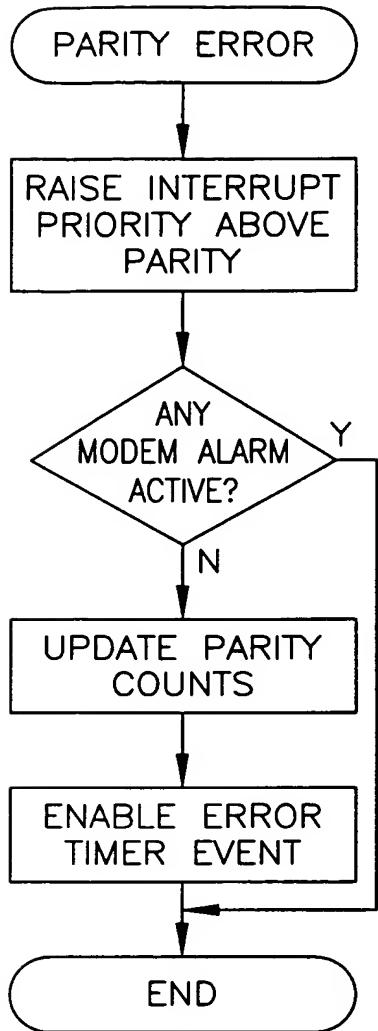


FIG. 41

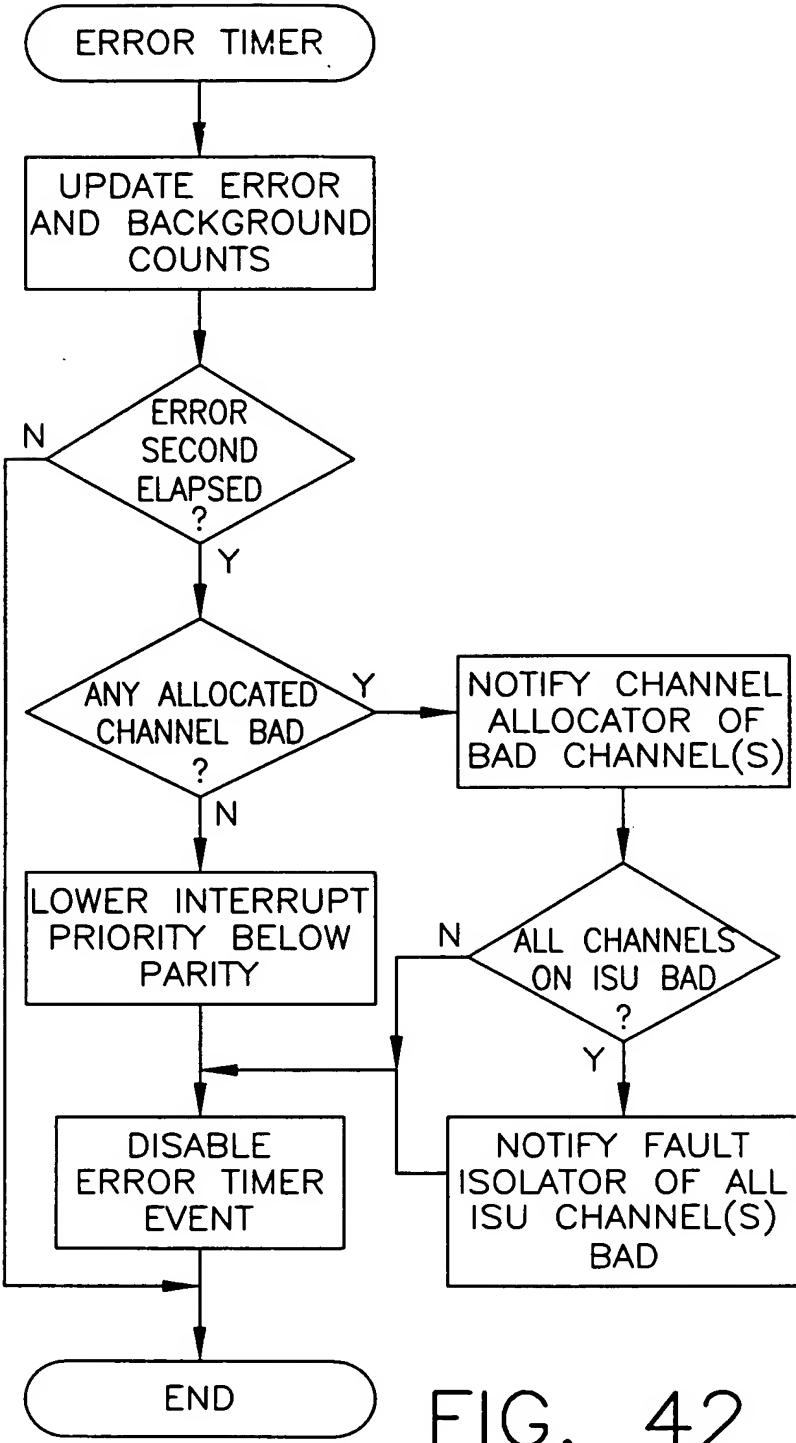


FIG. 42

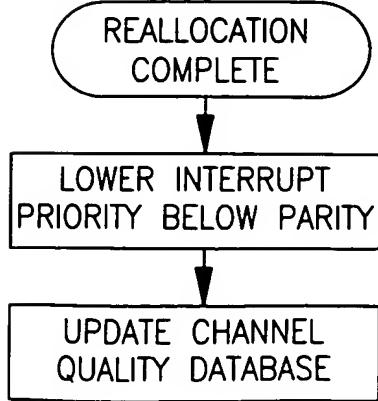
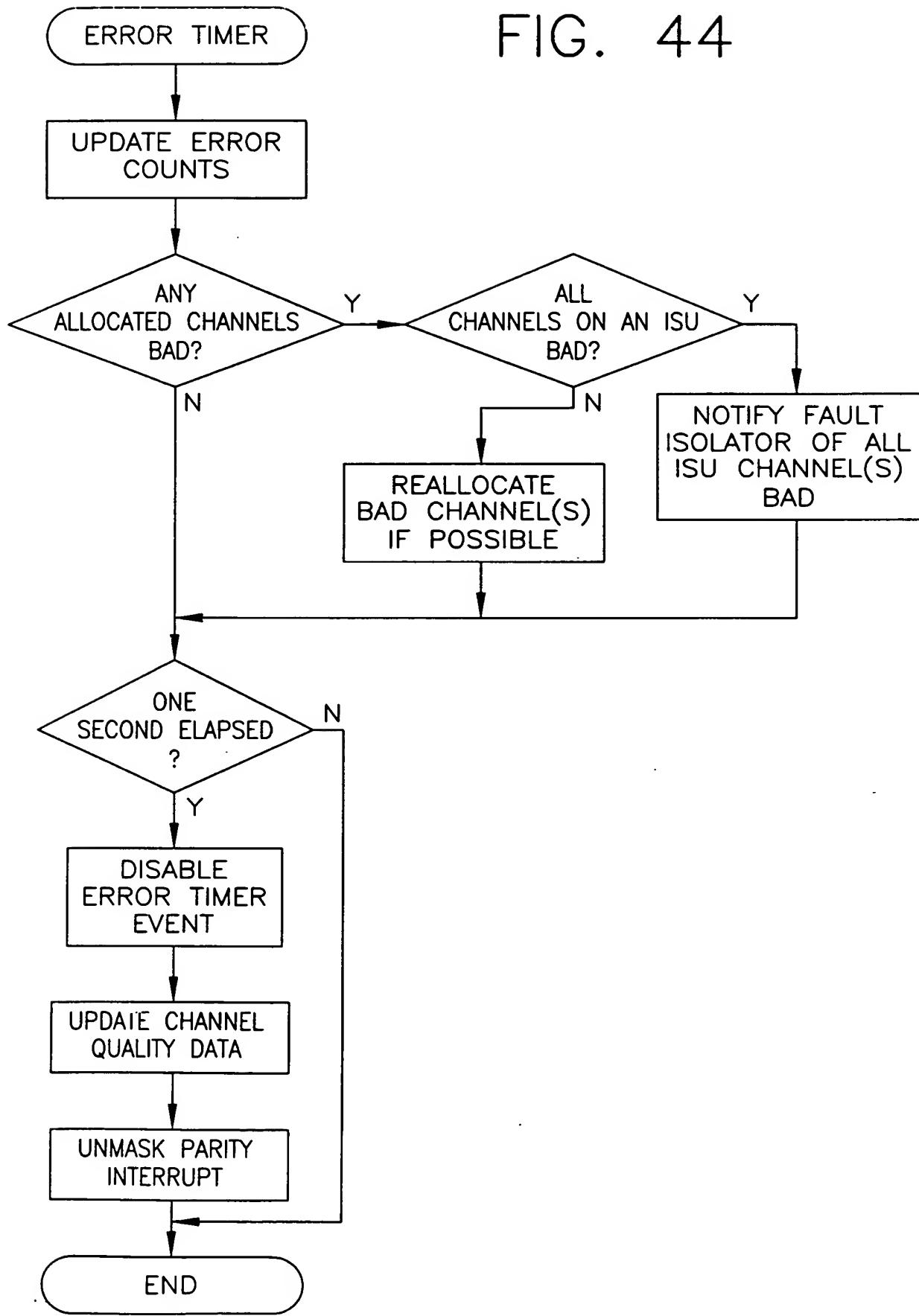


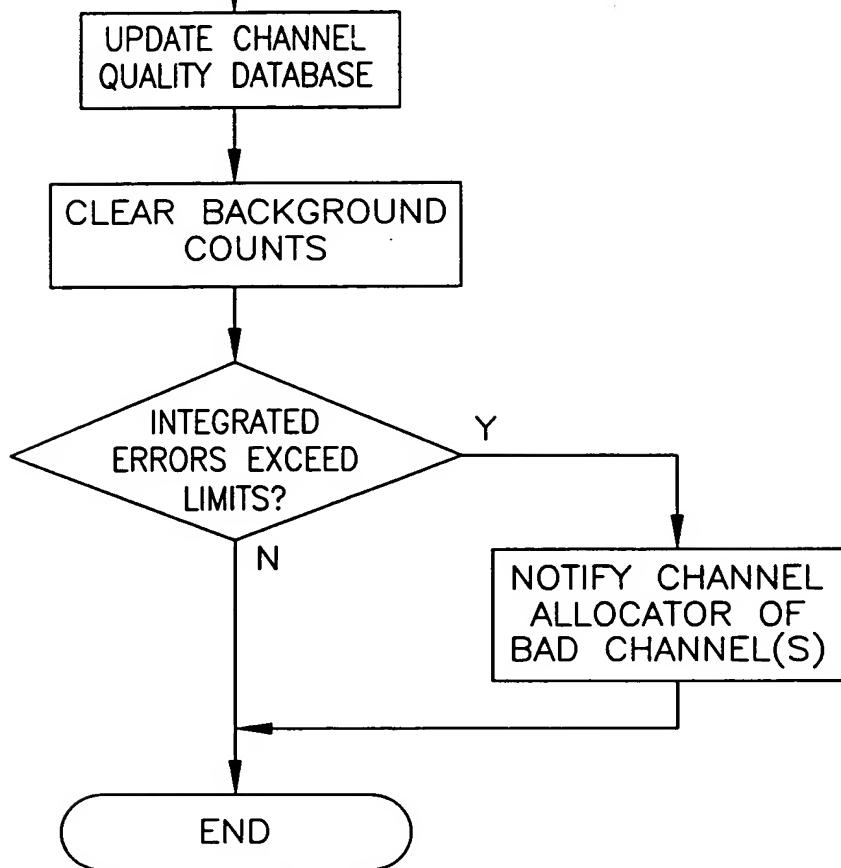
FIG. 43

FIG. 44



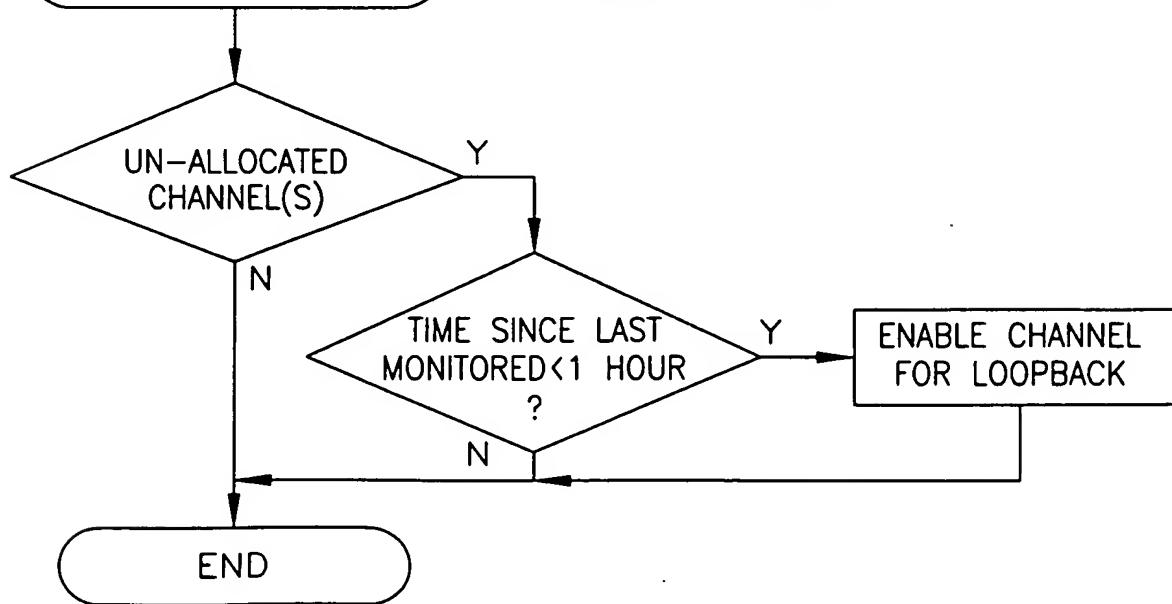
BACKGROUND TIMER

FIG. 45



BACKGROUND TIMER

FIG. 46



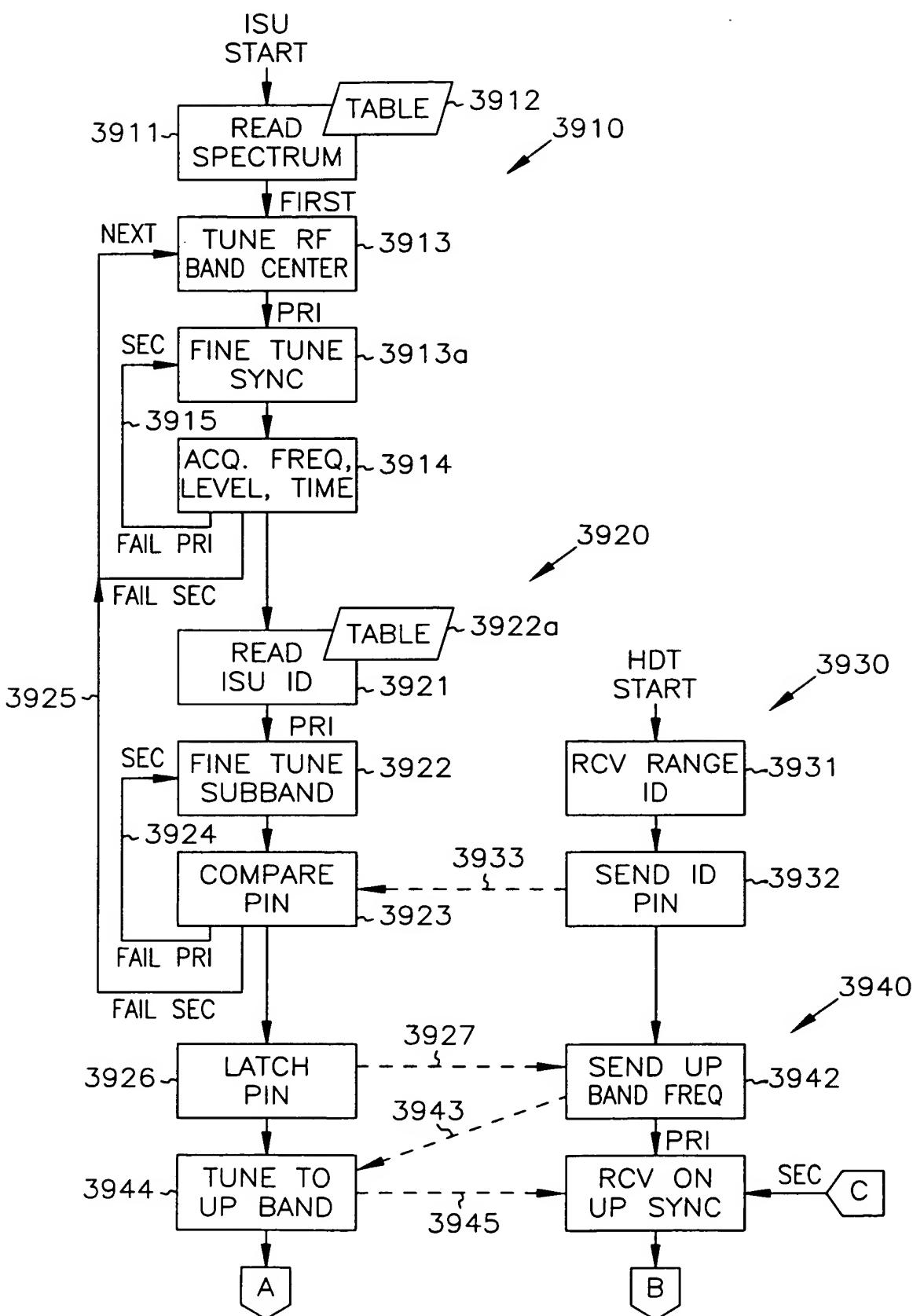


FIG. 47

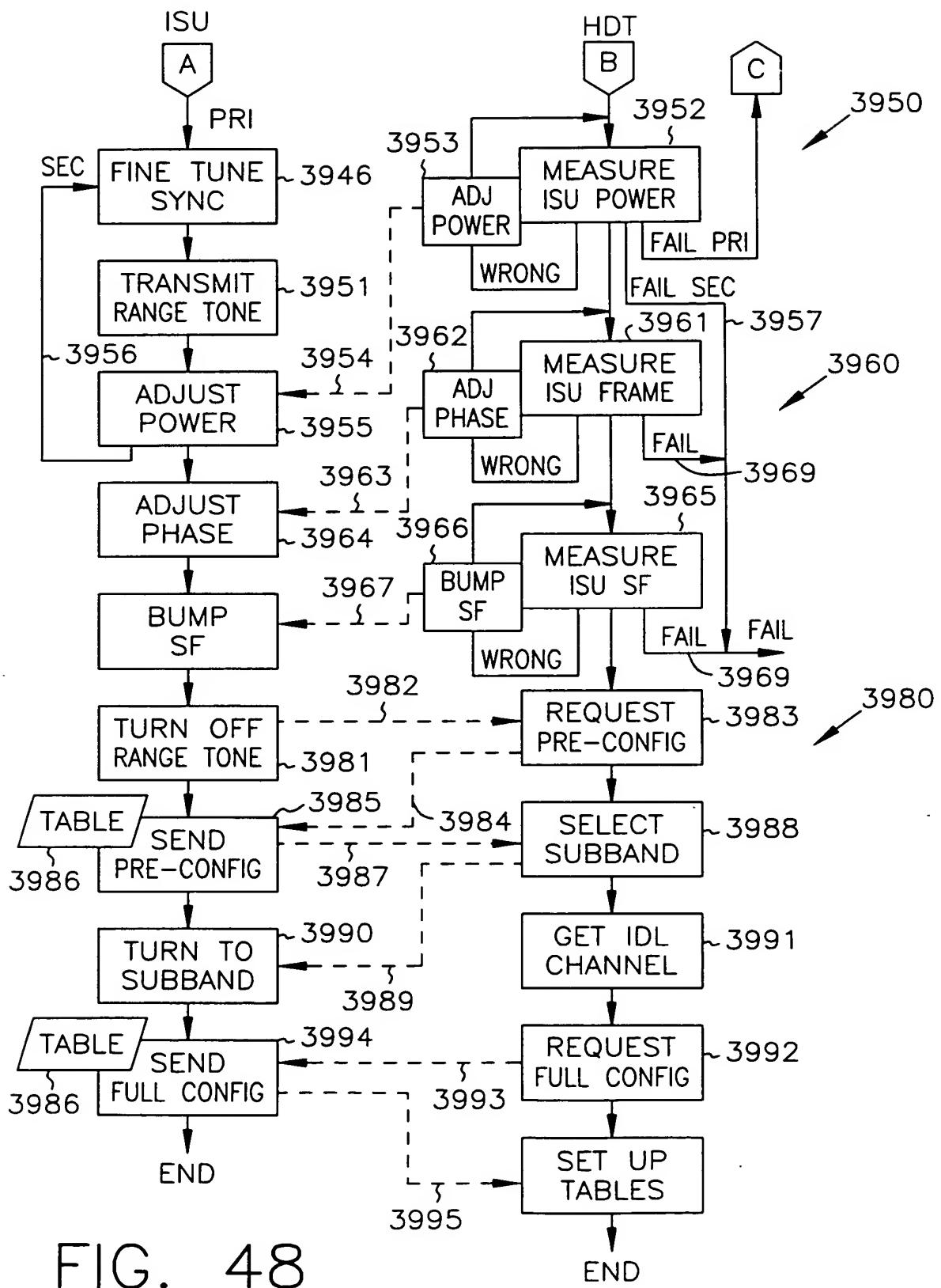


FIG. 48

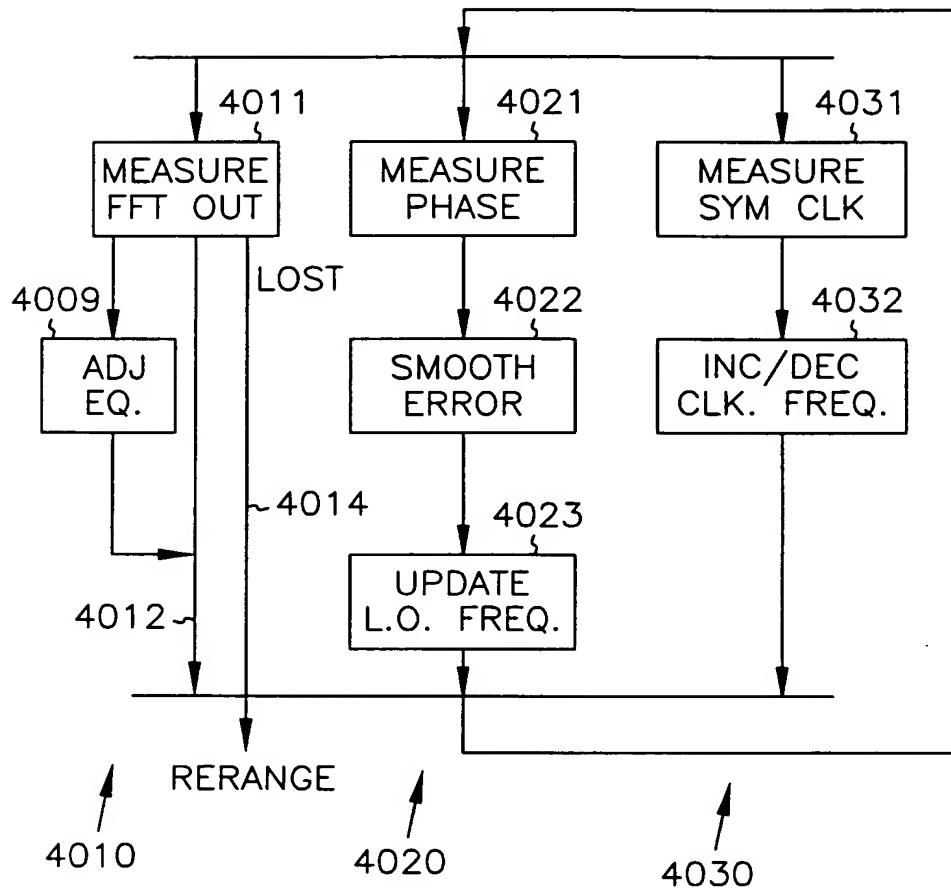


FIG. 49

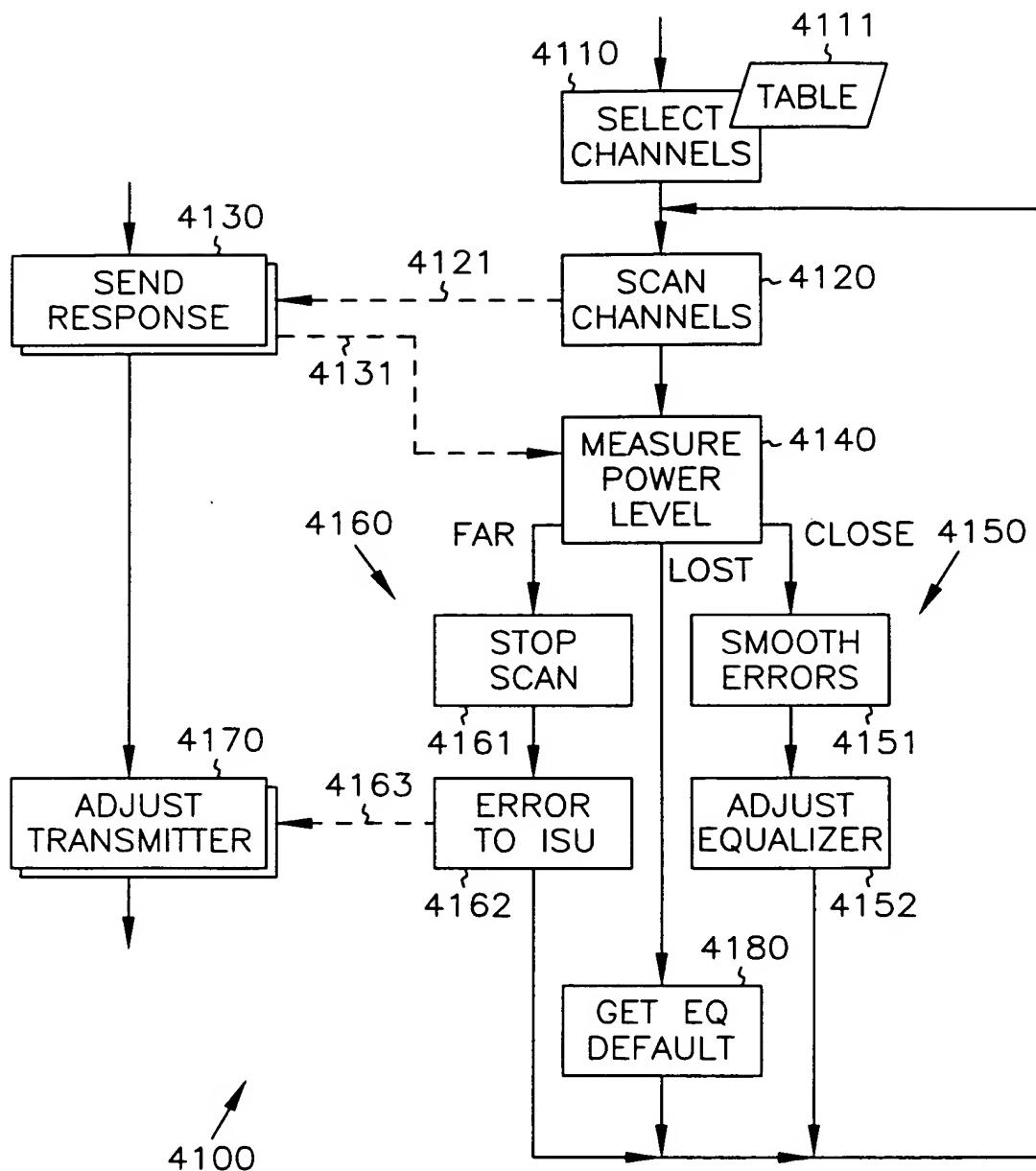
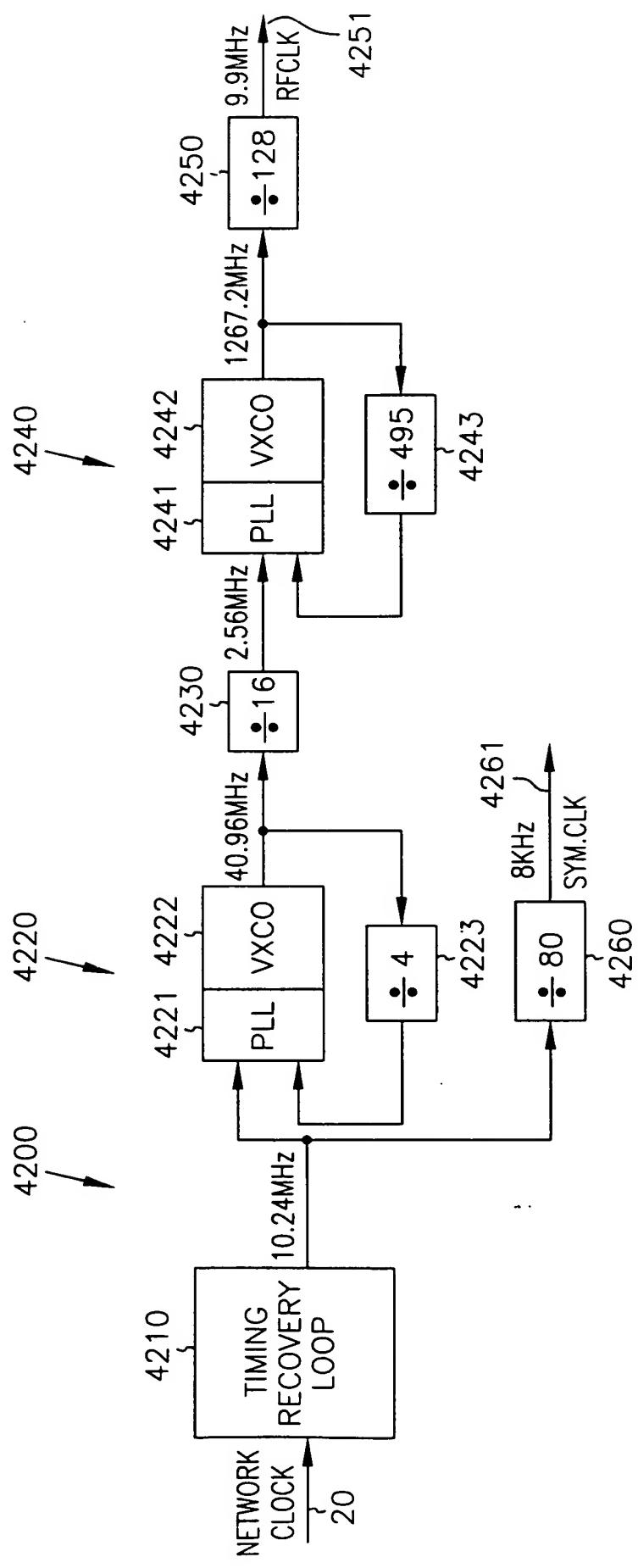


FIG. 50

FIG. 51



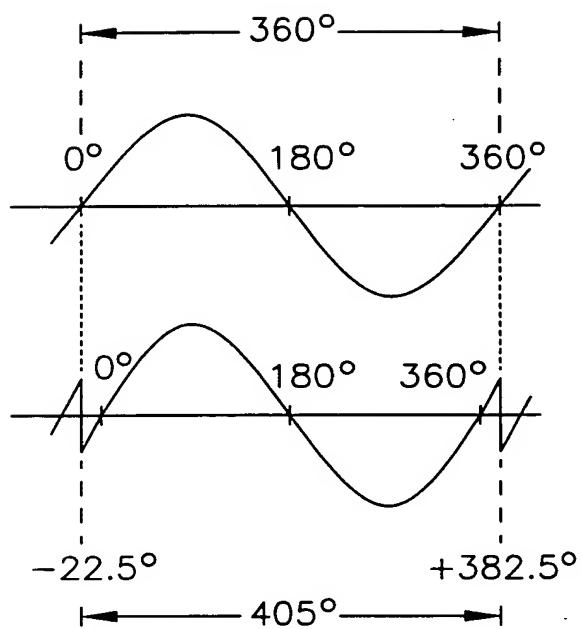


FIG. 52

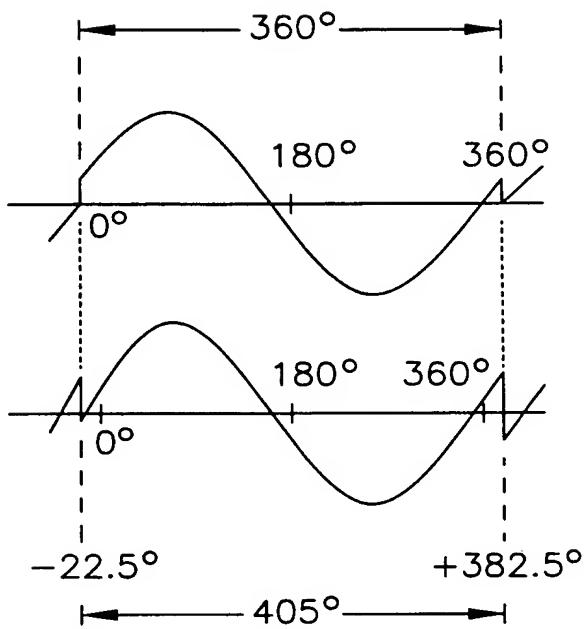


FIG. 53

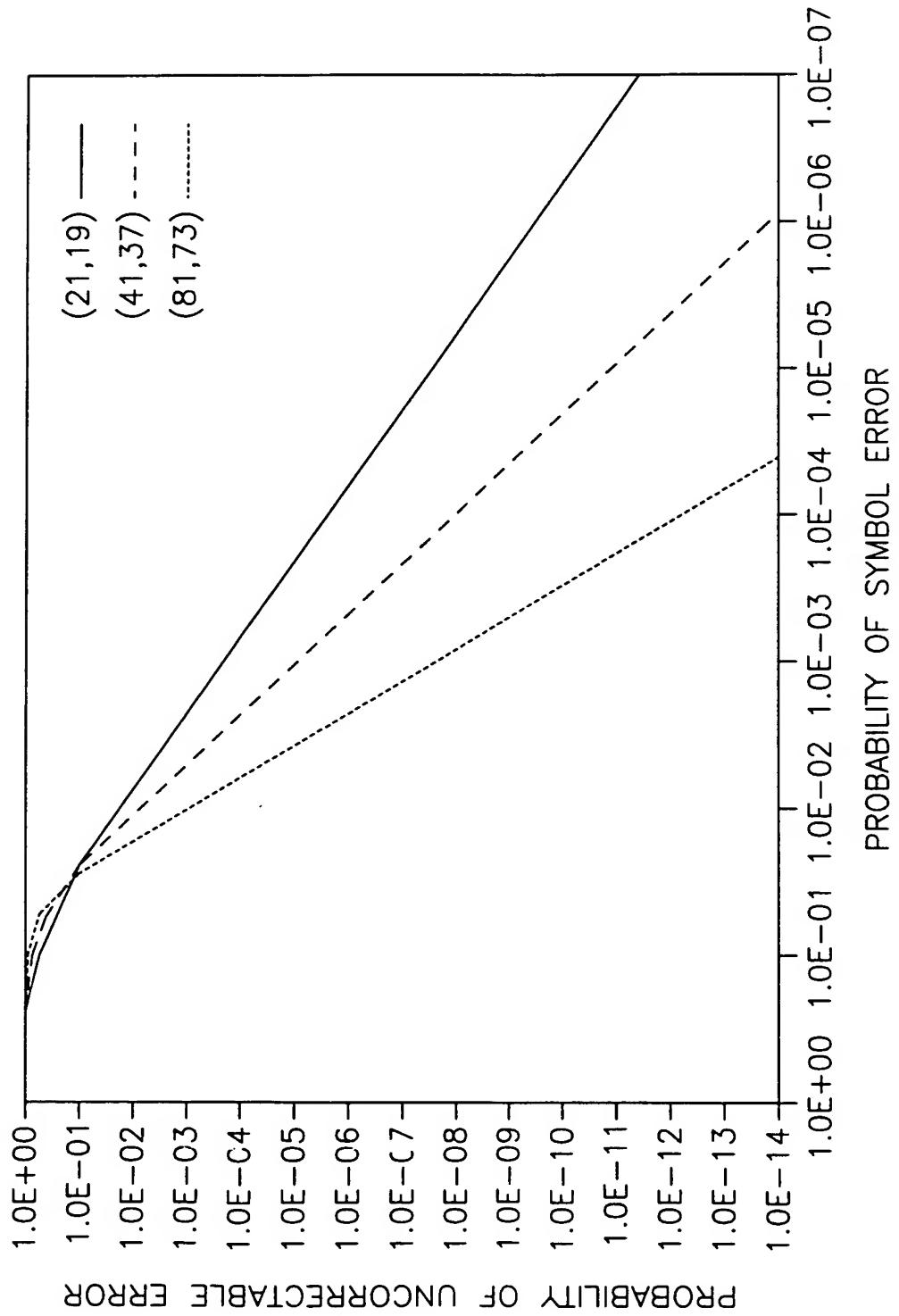


FIG. 54

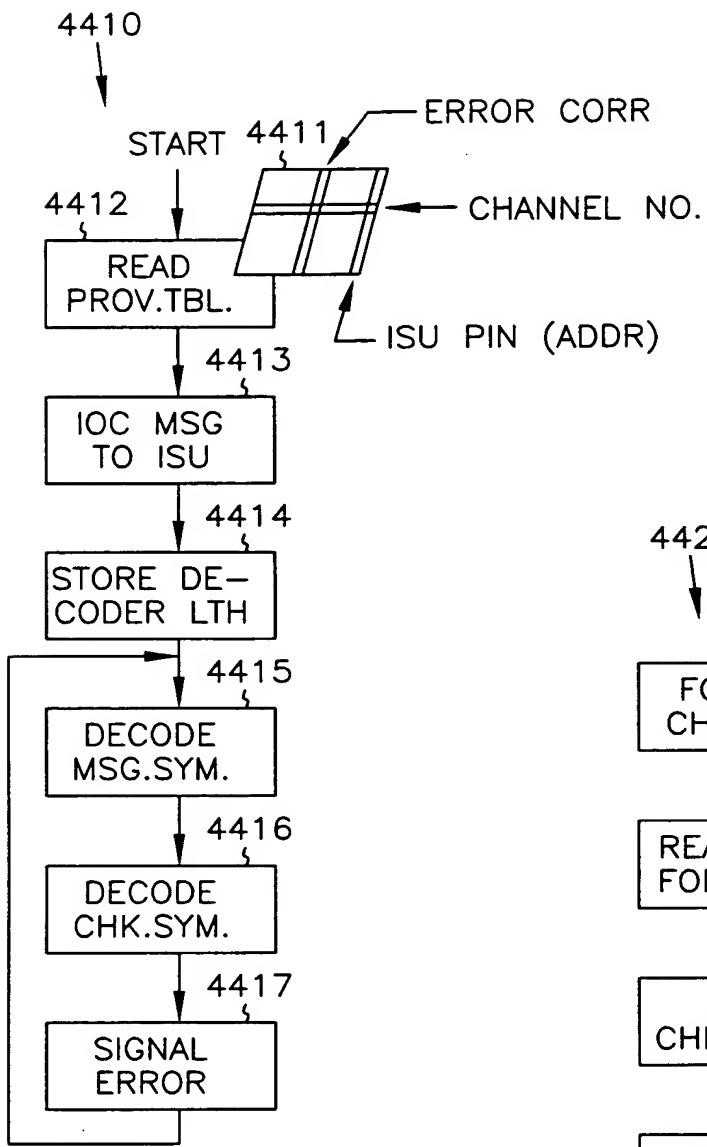


FIG. 55

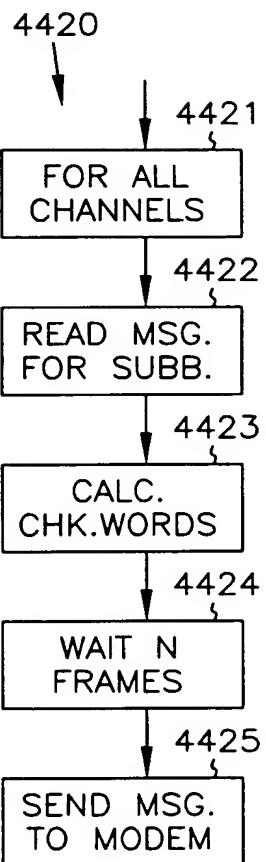


FIG. 56

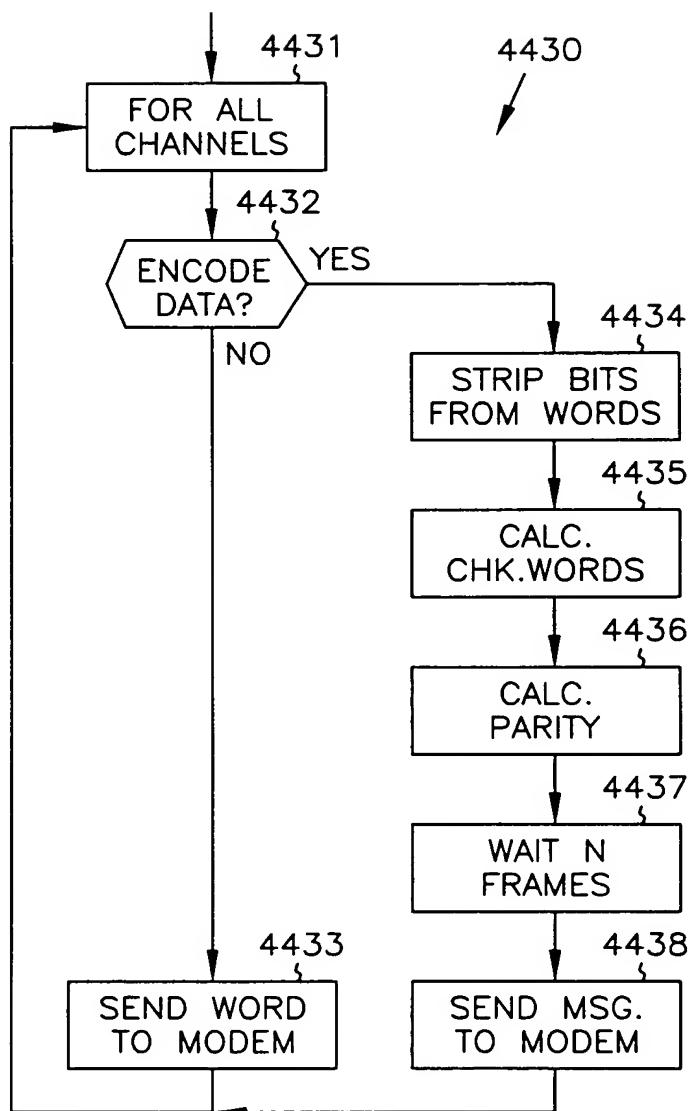
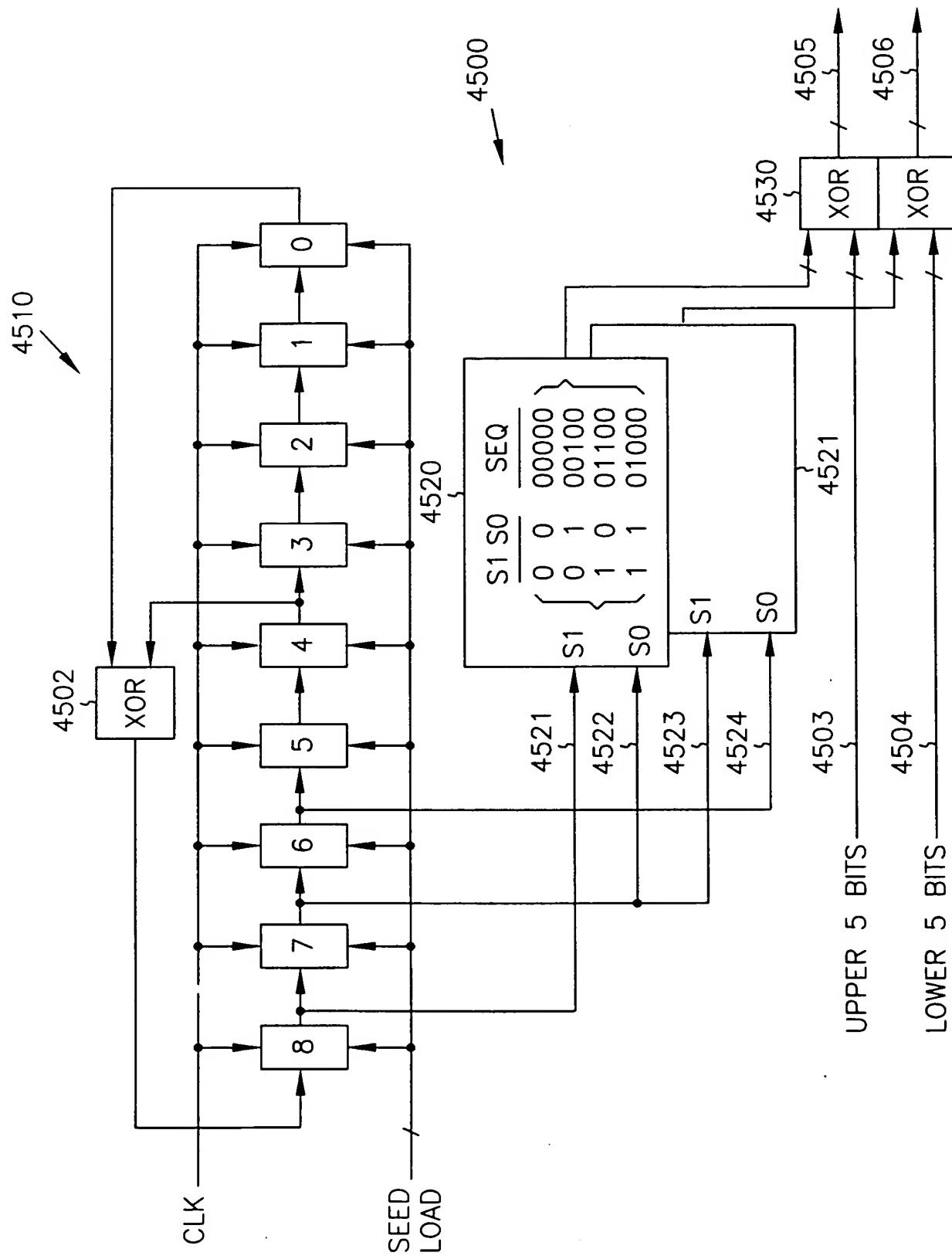


FIG. 57

4531

FIG. 58



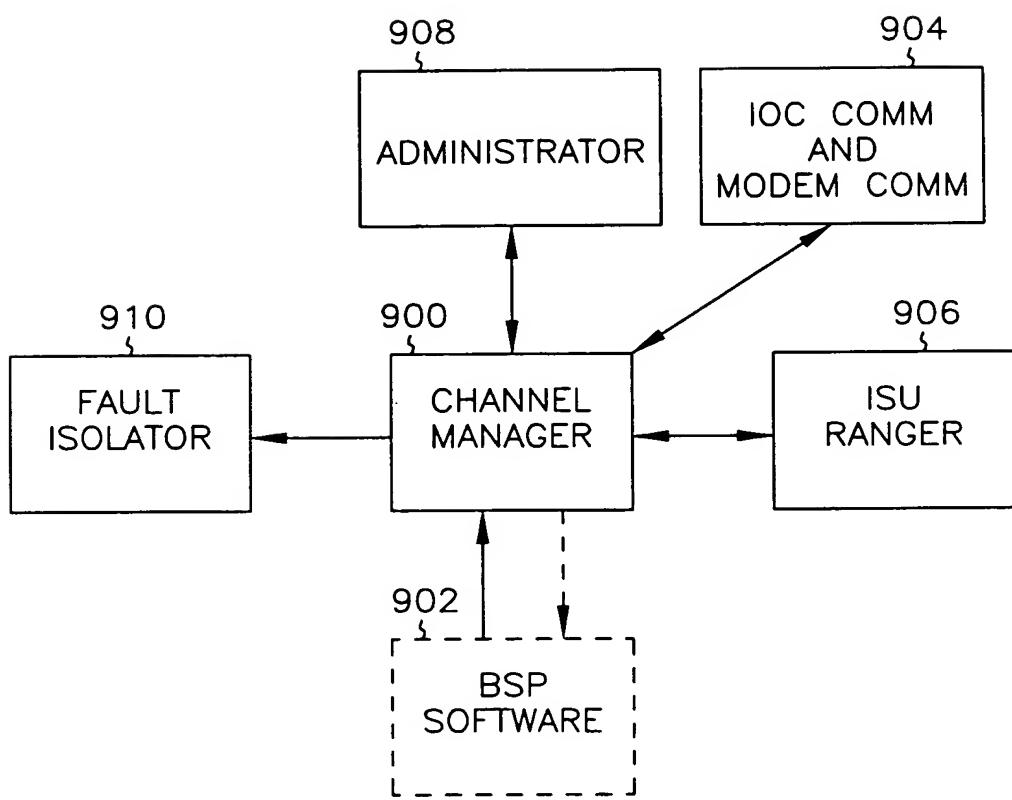


FIG. 59

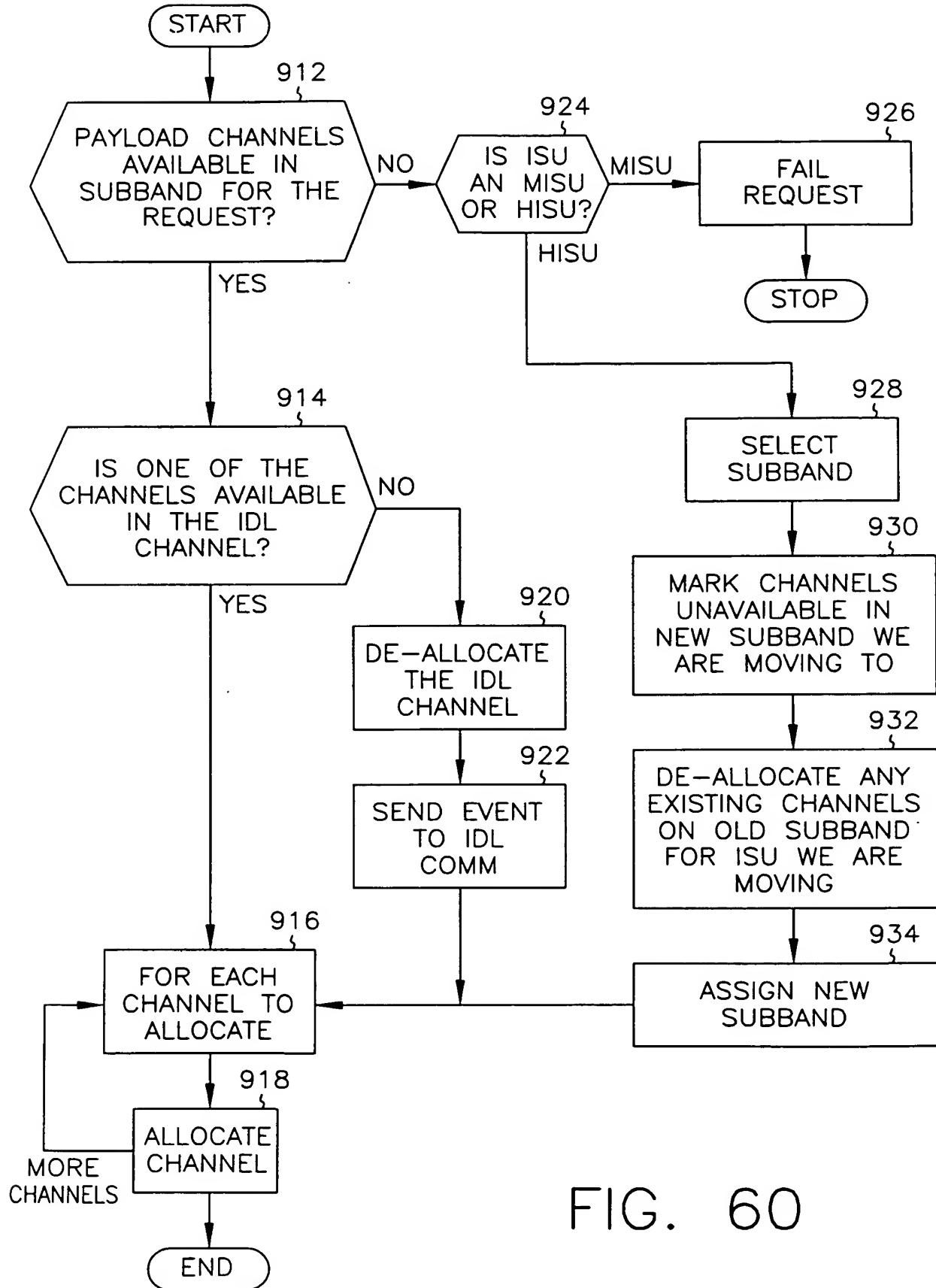


FIG. 60

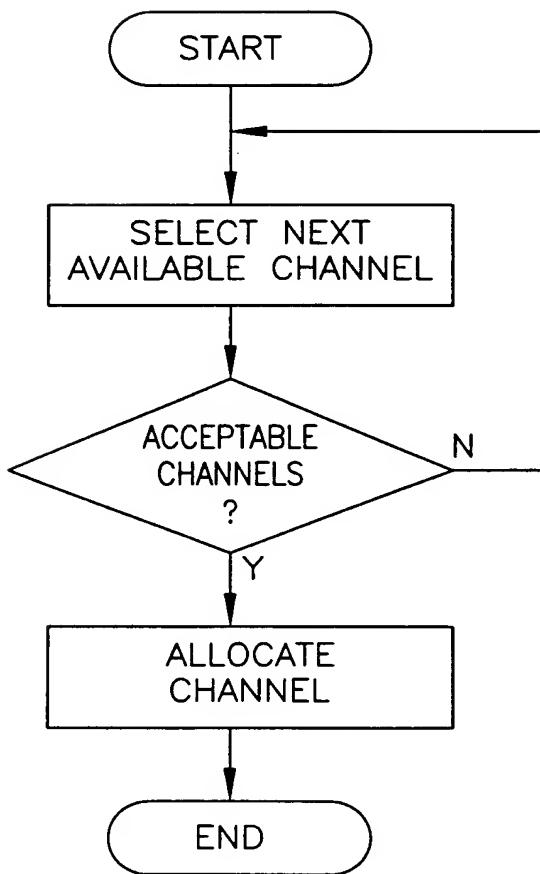


FIG. 61

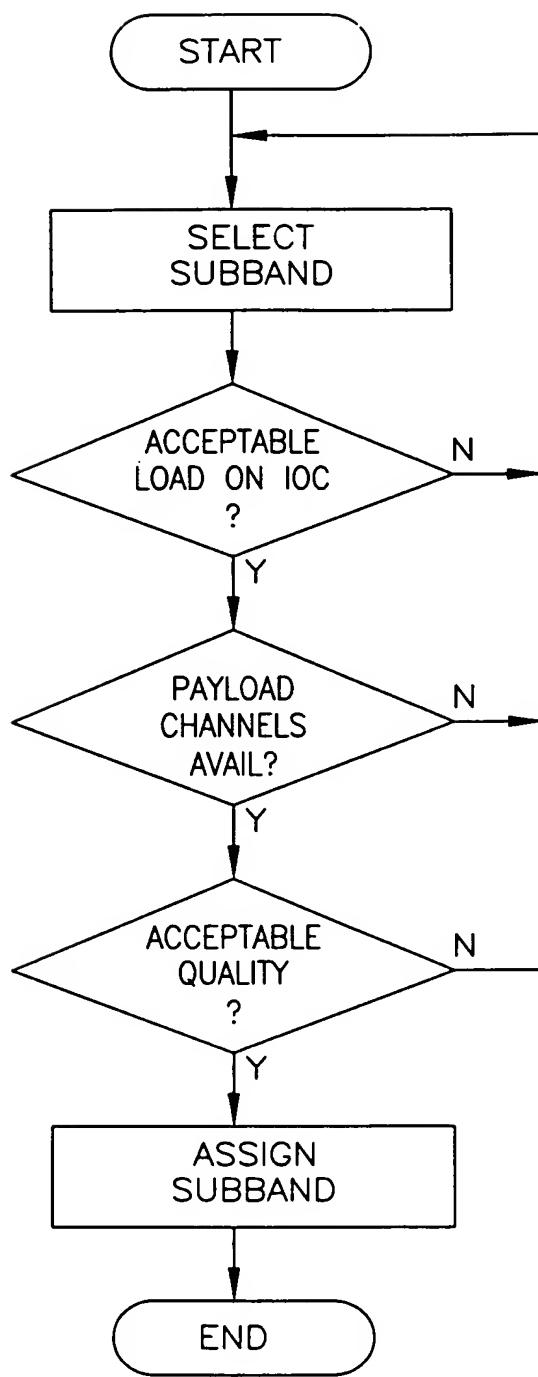


FIG. 62

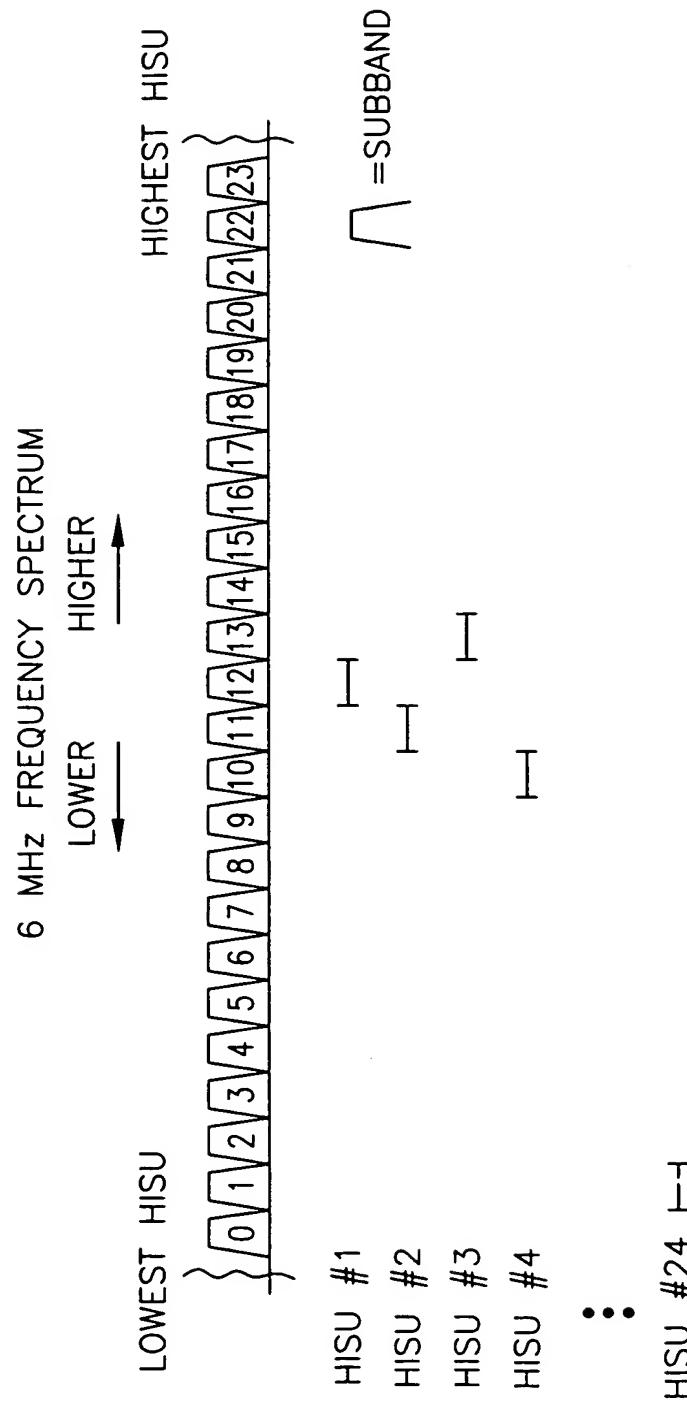


FIG. 63

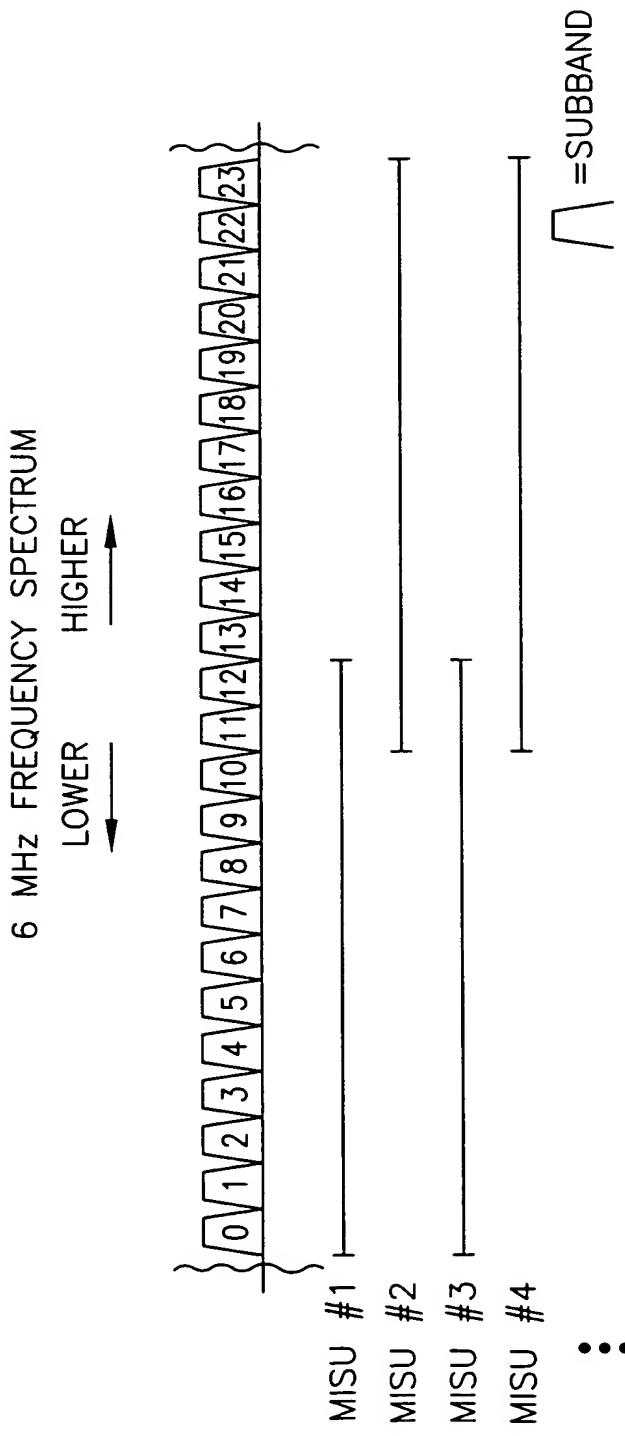


FIG. 64

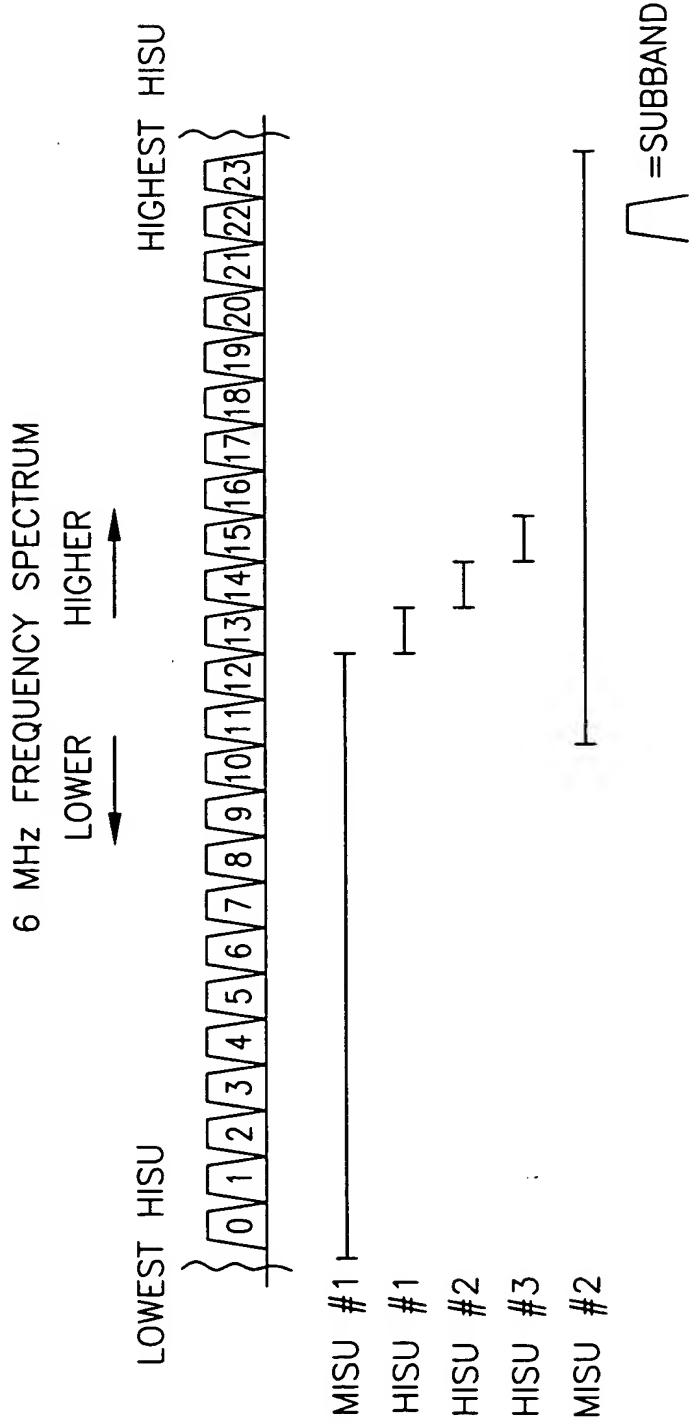


FIG. 65

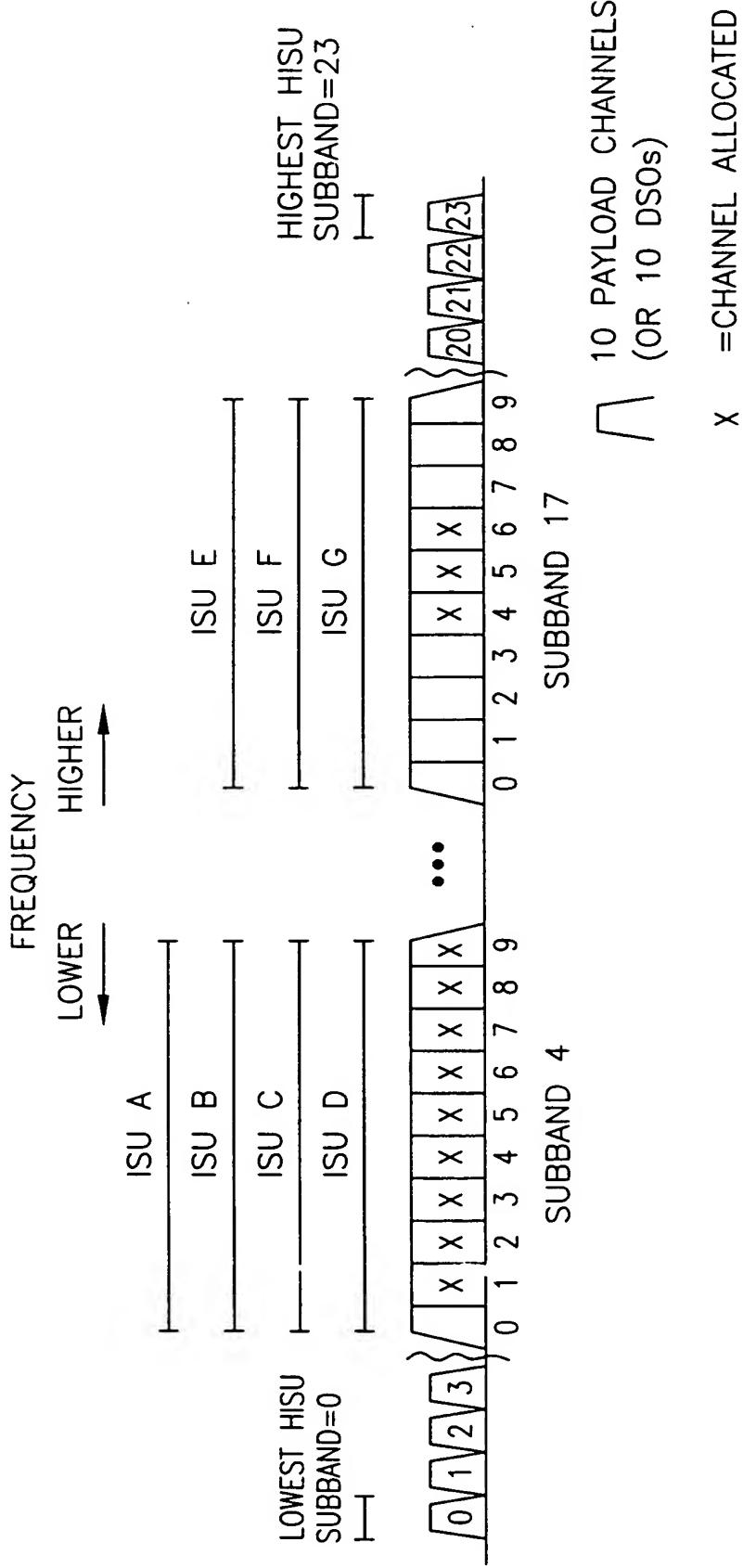


FIG. 66

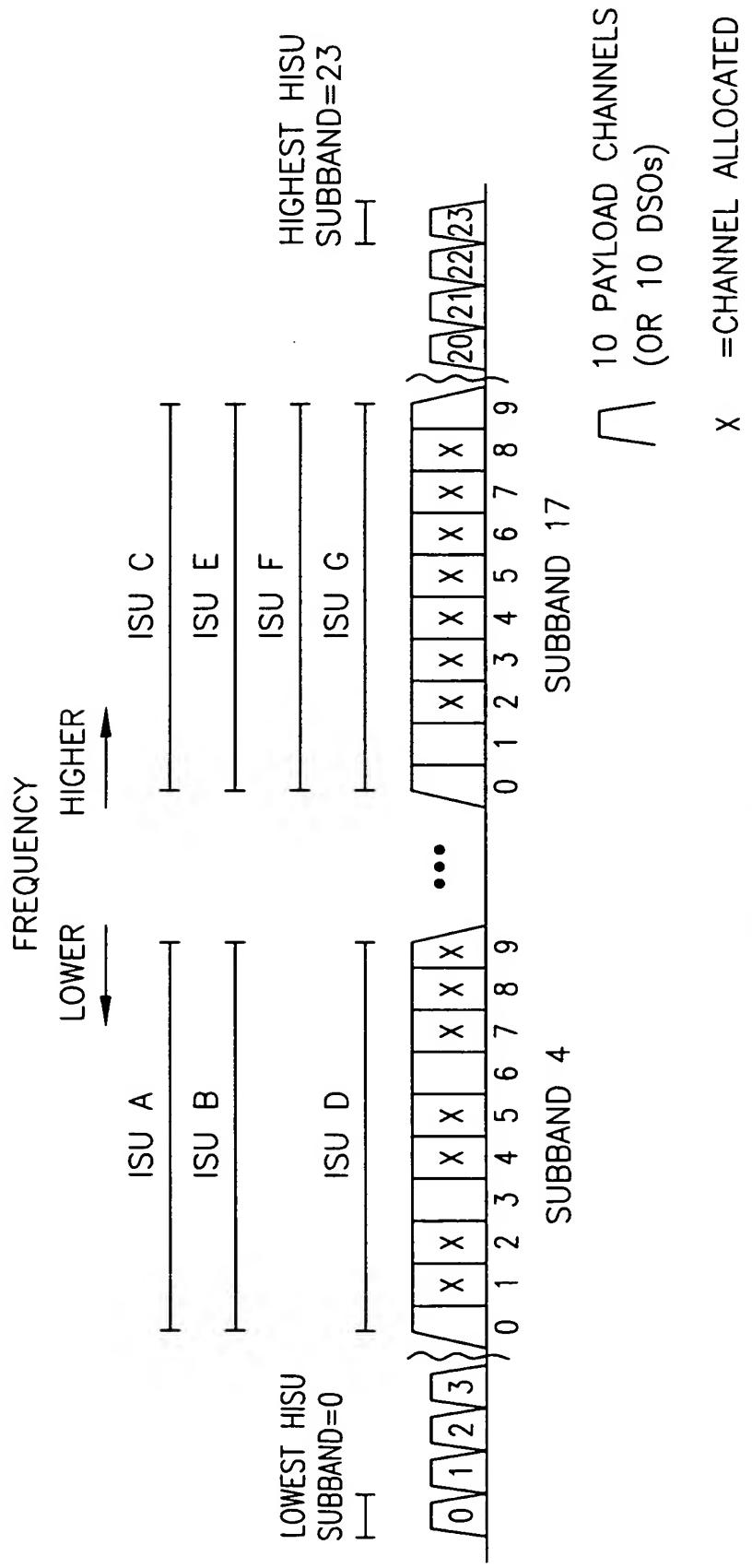


FIG. 67

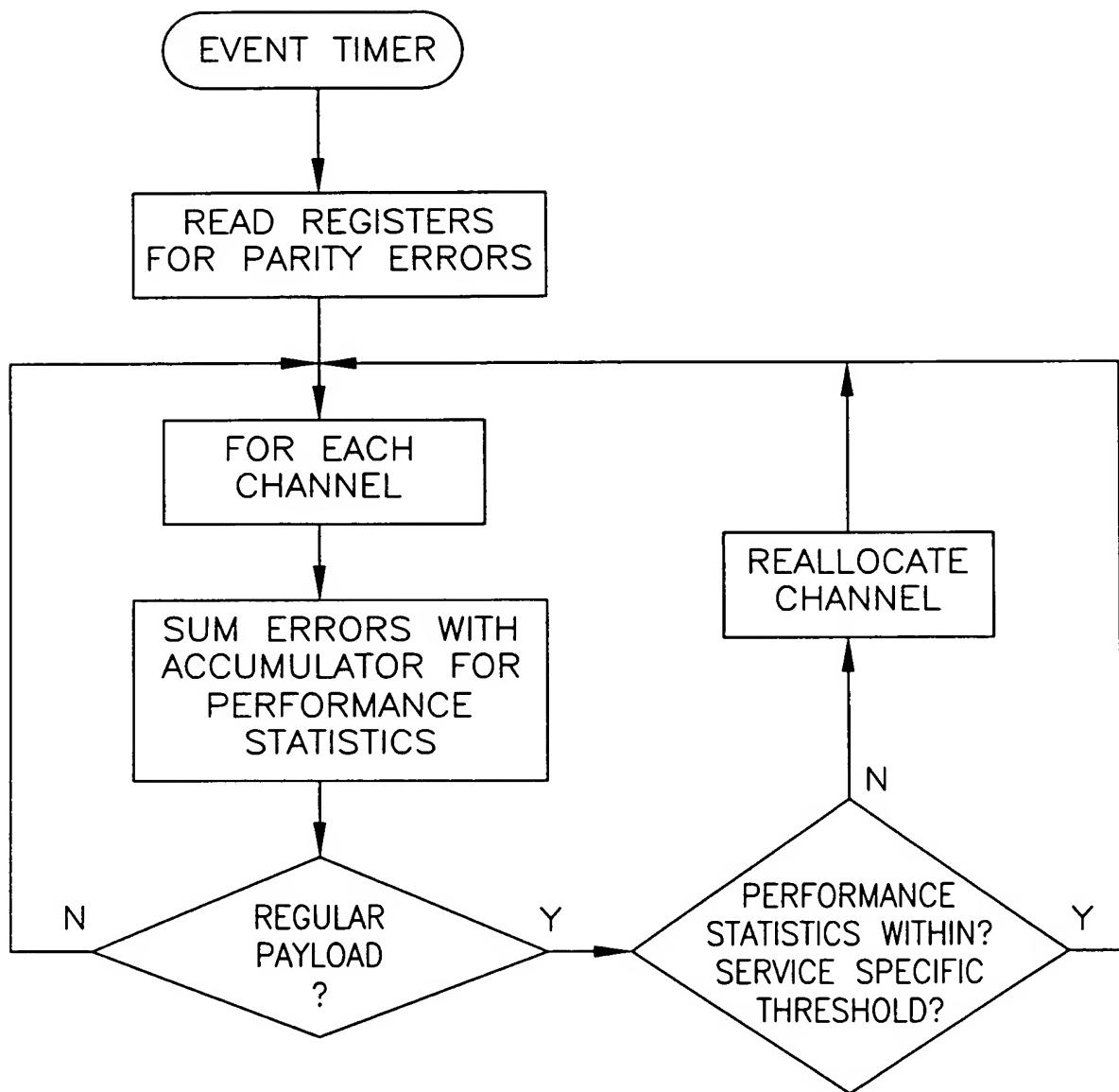


FIG. 68

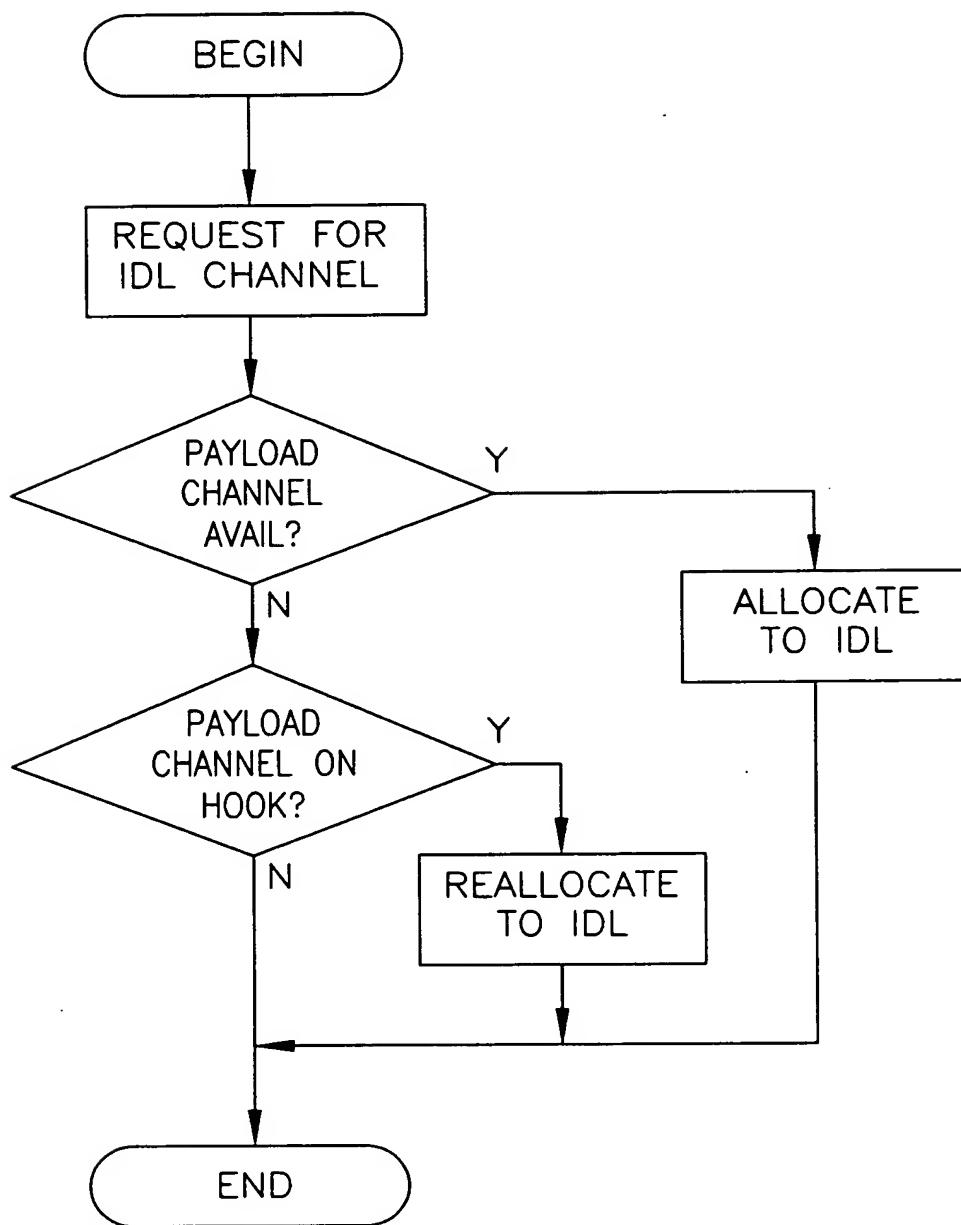


FIG. 69

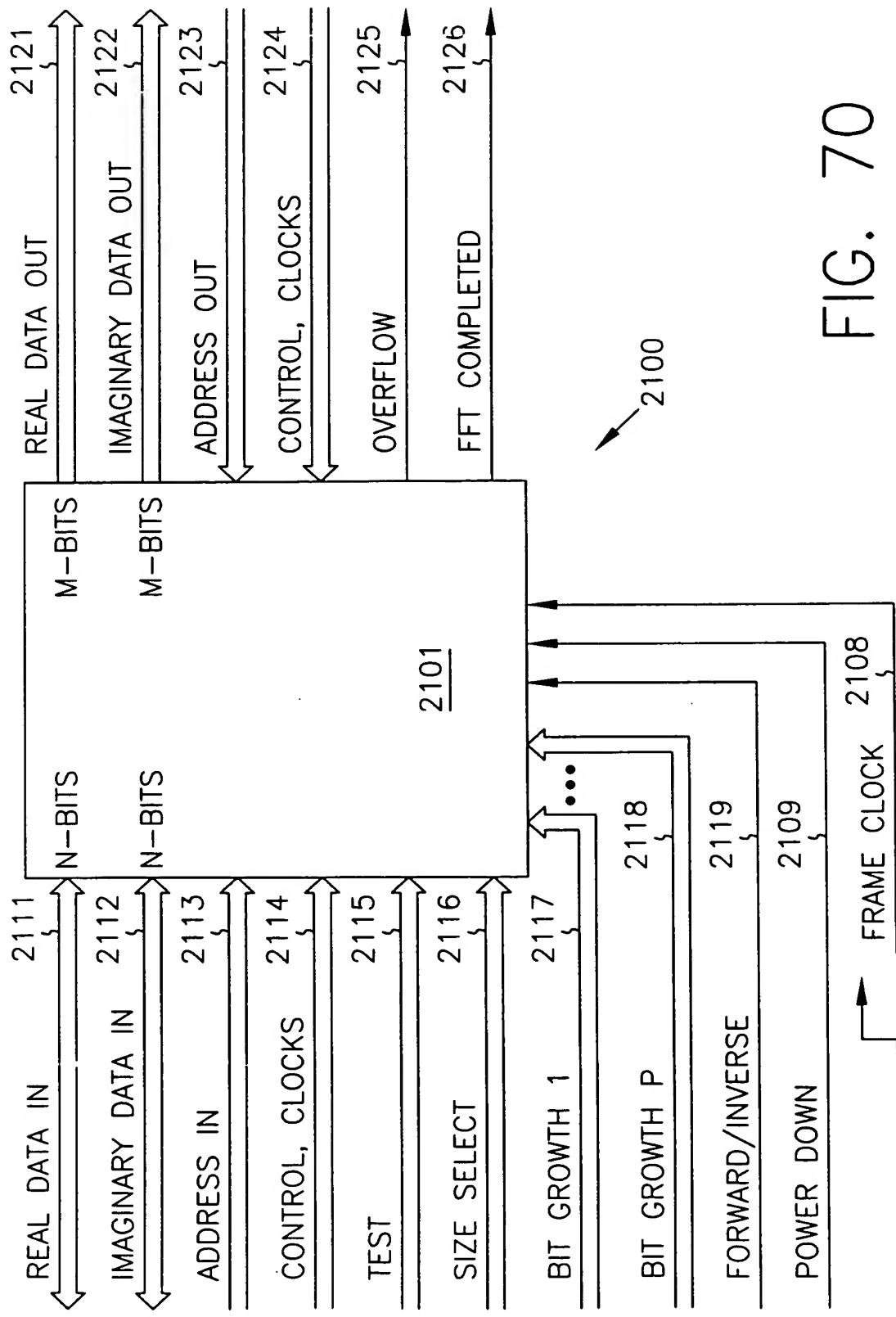
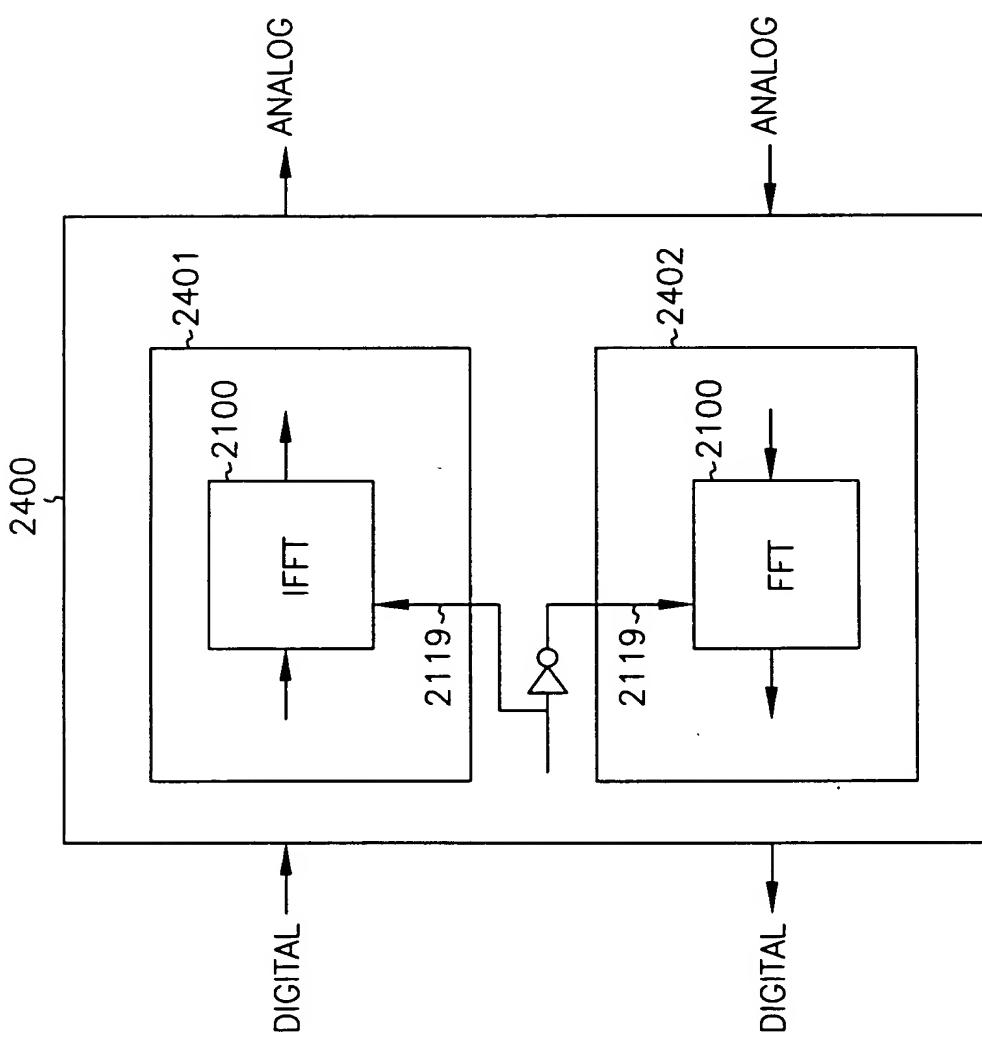


FIG. 70

FIG. 71



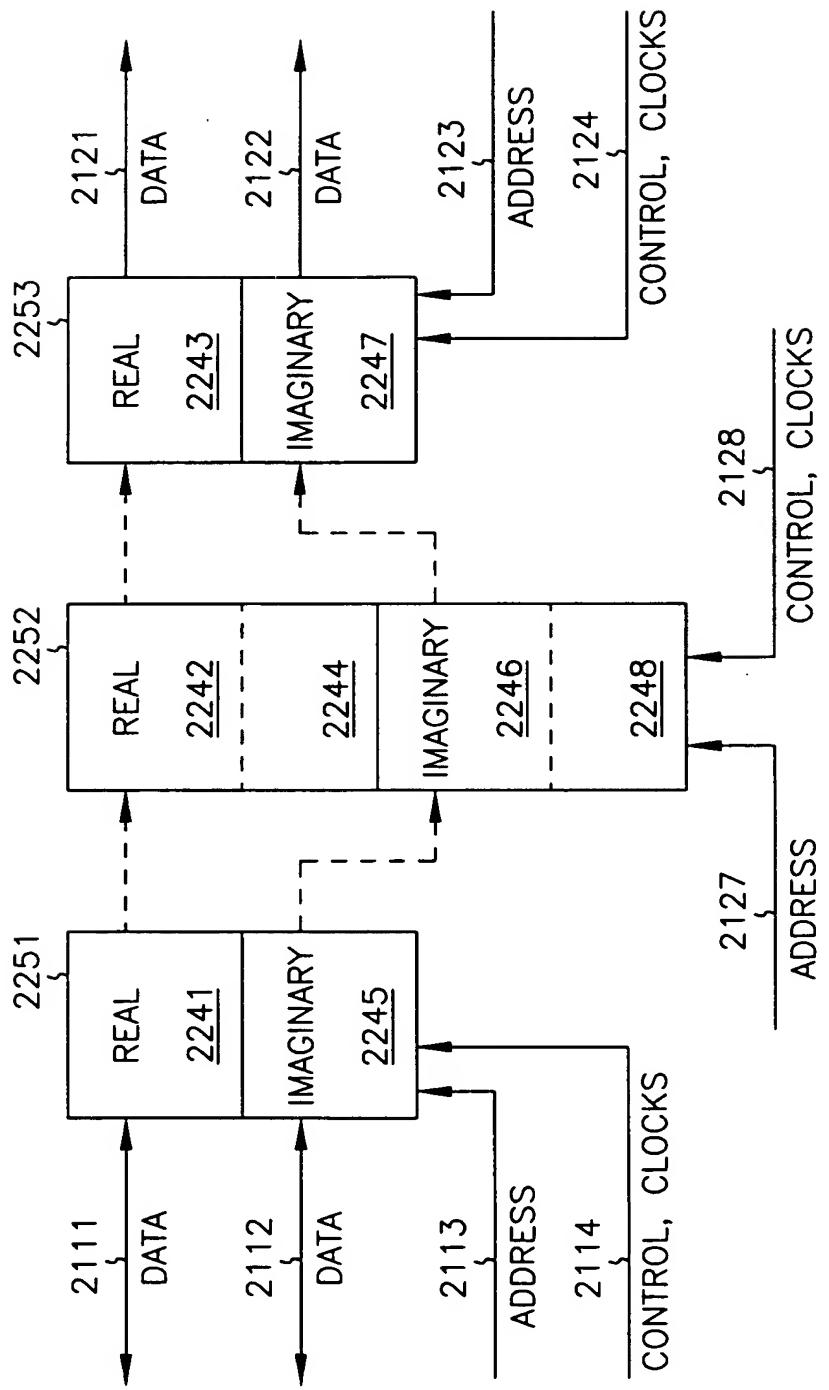


FIG. 72

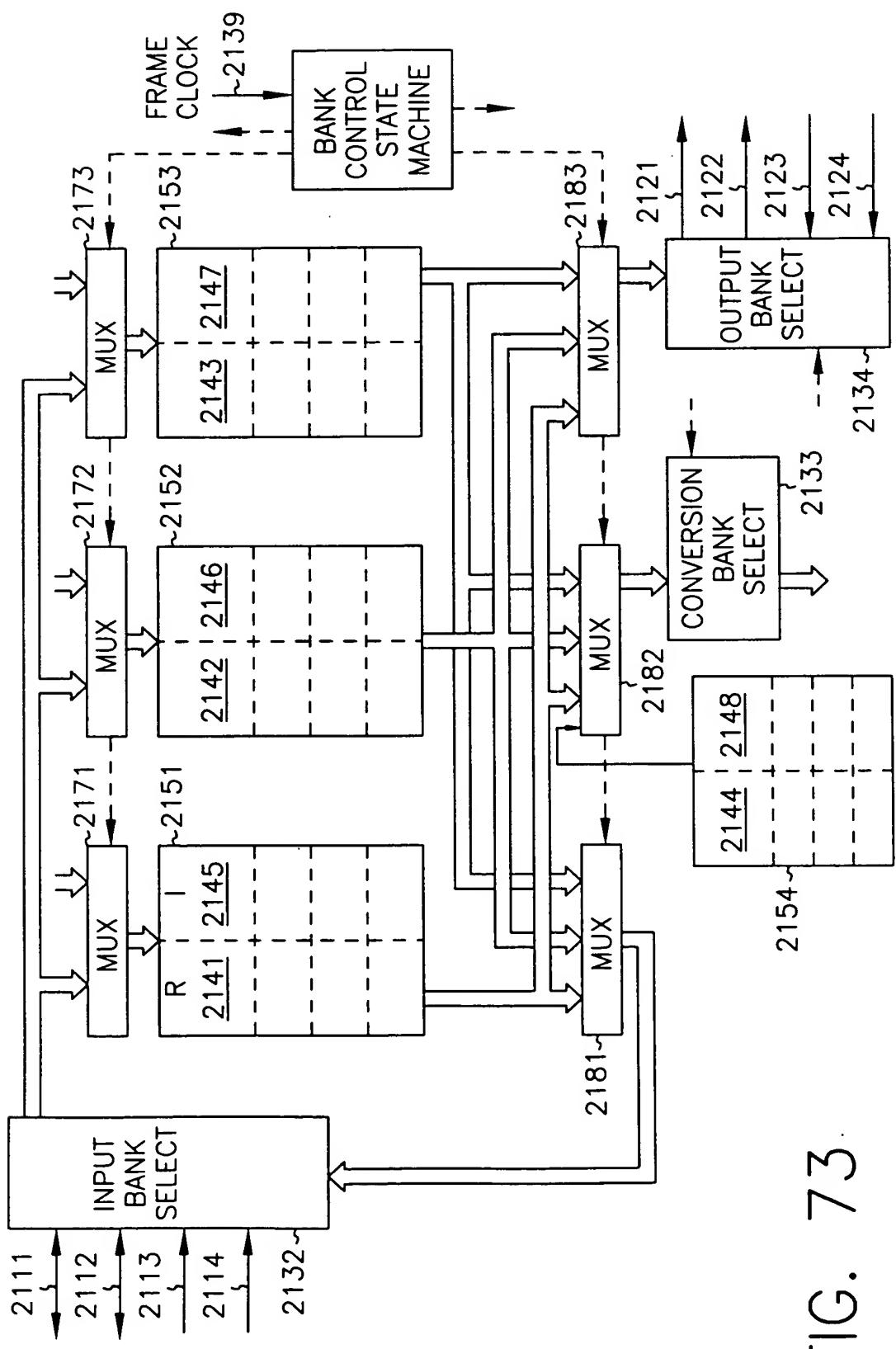
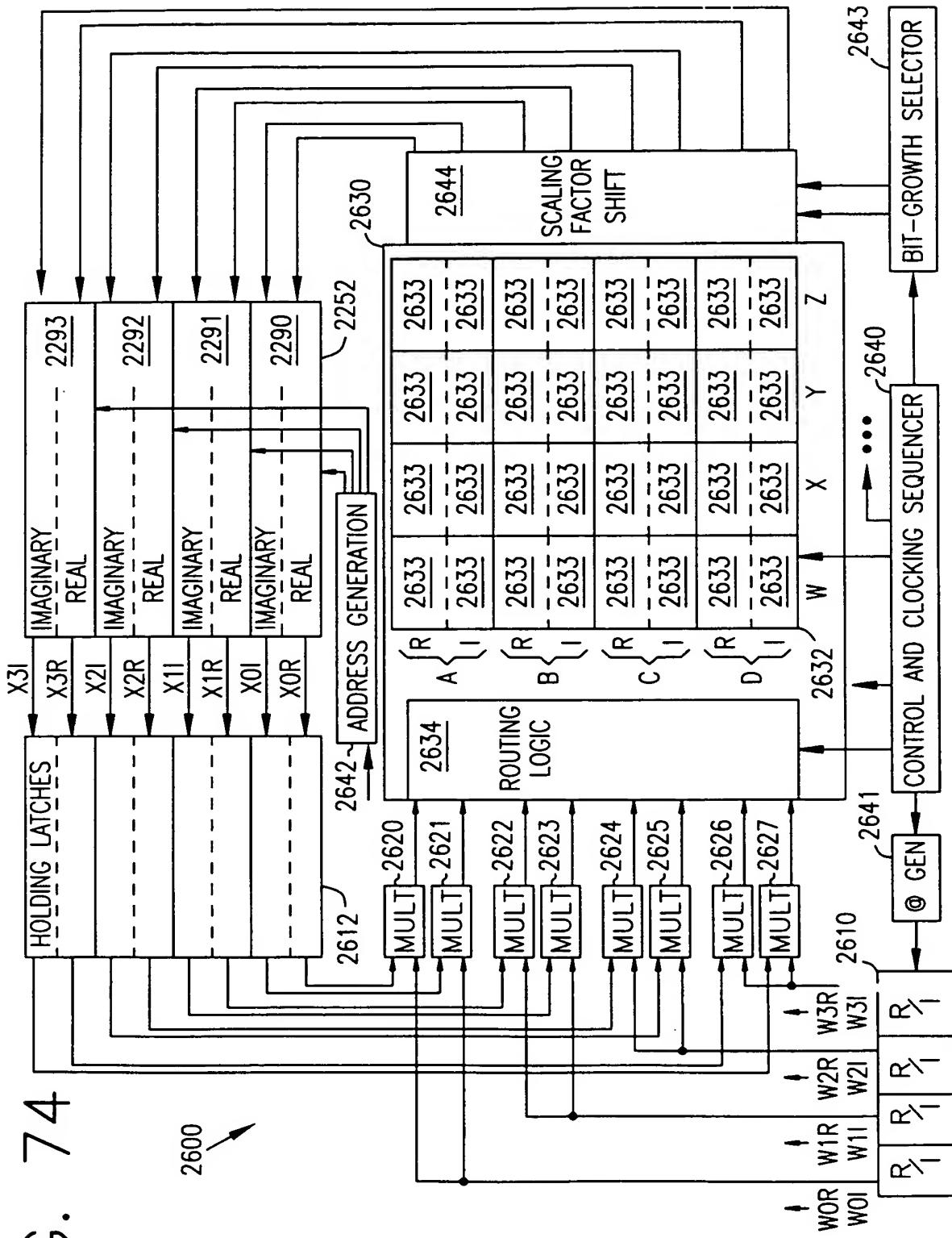


FIG. 73.

FIG. 74



THIS TABLE SHOWS THE ORDER OF CALCULATION FOR A TRANPOSED BUTTERFLY:

C0

$AWR = WR$	$AXR = XR$	$AYR = YR$	$AZR = ZR$
$AWI = WI$	$AXI = XI$	$AYI = YI$	$AZI = ZI$
$BWR = WR$	$BXR = XR$	$BYR = YR$	$BZR = ZR$
$BWI = WI$	$BXI = XI$	$BYI = YI$	$BZI = ZI$
$CWR = WR$	$CXR = XR$	$CYR = YR$	$CZR = ZR$
$CWI = WI$	$CXI = XI$	$CYI = YI$	$CZI = ZI$
$DWR = WR$	$DXR = XR$	$DYR = YR$	$DZR = ZR$
$DWI = WI$	$DXI = XI$	$DYI = YI$	$DZI = ZI$

2800

FIG. 75

C1

$AWR = AWR - WI$	$AXR = AXR - XI$	$AYR = AYR - YI$	$AZR = AZR - ZI$
$AWI = AWI + WR$	$AXI = AXI + XR$	$AYI = AYI + YR$	$AZI = AZI + ZR$
$BWR = BWR - WI$	$BXR = BXR - XI$	$BYR = BYR - YI$	$BZR = BZR - ZI$
$BWI = BWI + WR$	$BXI = BXI + XR$	$BYI = BYI + YR$	$BZI = BZI + ZR$
$CWR = CWR - WI$	$CXR = CXR - XI$	$CYR = CYR - YI$	$CZR = CZR - ZI$
$CWI = CWI + WR$	$CXI = CXI + XR$	$CYI = CYI + YR$	$CZI = CZI + ZR$
$DWR = DWR - WI$	$DXR = DXR - XI$	$DYR = DYR - YI$	$DZR = DZR - ZI$
$DWI = DWI + WR$	$DXI = DXI + XR$	$DYI = DYI + YR$	$DZI = DZI + ZR$

2800

FIG. 76

C2

$AWR = AWR + WR$ $AWI = AWI + WI$	$AXR = AXR + XI$ $AXI = AXI - XR$	$AYR = AYR - YR$ $AYI = AYI - YI$	$AZR = AZR - ZI$ $AZI = AZI + ZR$
$BWR = BWR + WR$ $BWI = BWI + WI$	$BXR = BXR + XI$ $BXI = BXI - XR$	$BYR = BYR - YR$ $BYI = BYI - YI$	$BZR = BZR - ZI$ $BZI = BZI + ZR$
$CWR = CWR + WR$ $CWI = CWI + WI$	$CXR = CXR + XI$ $CXI = CXI - XR$	$CYR = CYR - YR$ $CYI = CYI - YI$	$CZR = CZR - ZI$ $CZI = CZI + ZR$
$DWR = DWR + WR$ $DWI = DWI + WI$	$DXR = DXR + XI$ $DXI = DXI - XR$	$DYR = DYR - YR$ $DYI = DYI - YI$	$DZR = DZR - ZI$ $DZI = DZI + ZR$

FIG. 77

2800

FIG. 78

2800

C3

$AWR = AWR - WI$ $AWI = AWI + WR$	$AXR = AXR + XI$ $AXI = AXI + XI$	$AYR = AYR + YI$ $AYI = AYI - YR$	$AZR = AZR - ZR$ $AZI = AZI - ZI$
$BWR = BWR - WI$ $BWI = BWI + WR$	$BXR = BXR + XI$ $BXI = BXI + XI$	$BYR = BYR + YI$ $BYI = BYI - YR$	$BZR = BZR - ZR$ $BZI = BZI - ZI$
$CWR = CWR - WI$ $CWI = CWI + WR$	$CXR = CXR + XI$ $CXI = CXI + XI$	$CYR = CYR + YI$ $CYI = CYI - YR$	$CZR = CZR - ZR$ $CZI = CZI - ZI$
$DWR = DWR - WI$ $DWI = DWI + WR$	$DXR = DXR + XI$ $DXI = DXI + XI$	$DYR = DYR + YI$ $DYI = DYI - YR$	$DZR = DZR - ZR$ $DZI = DZI - ZI$

2632 2800

C4

$AWR = AWR + WR$ $AWI = AWI + WI$	$AXR = AXR - XR$ $AXI = AXI - XI$	$AYR = AYR + YR$ $AYI = AYI + YI$	$AZR = AZR - ZR$ $AZI = AZI - ZI$
$BWR = BWR + WR$ $BWI = BWI + WI$	$BXR = BXR - XR$ $BXI = BXI - XI$	$BYR = BYR + YR$ $BYI = BYI + YI$	$BZR = BZR - ZR$ $BZI = BZI - ZI$
$CWR = CWR + WR$ $CWI = CWI + WI$	$CXR = CXR - XR$ $CXI = CXI - XI$	$CYR = CYR + YR$ $CYI = CYI + YI$	$CZR = CZR - ZR$ $CZI = CZI - ZI$
$DWR = DWR + WR$ $DWI = DWI + WI$	$DXR = DXR - XR$ $DXI = DXI - XI$	$DYR = DYR + YR$ $DYI = DYI + YI$	$DZR = DZR - ZR$ $DZI = DZI - ZI$

FIG. 79

C5

$AWR = AWR - WI$ $AWI = AWI + WR$	$AXR = AXR + XI$ $AXI = AXI - XR$	$AYR = AYR - YI$ $AYI = AYI + YR$	$AZR = AZR + ZI$ $AZI = AZI - ZR$
$BWR = BWR - WI$ $BWI = BWI + WR$	$BXR = BXR + XI$ $BXI = BXI - XR$	$BYR = BYR - YI$ $BYI = BYI + YR$	$BZR = BZR + ZI$ $BZI = BZI - ZR$
$CWR = CWR - WI$ $CWI = CWI + WR$	$CXR = CXR + XI$ $CXI = CXI - XR$	$CYR = CYR - YI$ $CYI = CYI + YR$	$CZR = CZR + ZI$ $CZI = CZI - ZR$
$DWR = DWR - WI$ $DWI = DWI + WR$	$DXR = DXR + XI$ $DXI = DXI - XR$	$DYR = DYR - YI$ $DYI = DYI + YR$	$DZR = DZR + ZI$ $DZI = DZI - ZR$

FIG. 80

C6

$AWR = AWR + WR$ $AWI = AWI + WI$	$AXR = AXR - XI$ $AXI = AXI + XR$	$AYR = AYR - YR$ $AYI = AYI - YI$	$AZR = AZR + ZI$ $AZI = AZI - ZR$	2632
$BWR = BWR + WR$ $BWI = BWI + WI$	$BXR = BXR - XI$ $BXI = BXI + XR$	$BYR = BYR - YR$ $BYI = BYI - YI$	$BZR = BZR + ZI$ $BZI = BZI - ZR$	2800
$CWR = CWR + WR$ $CWI = CWI + WI$	$CXR = CXR - XI$ $CXI = CXI + XR$	$CYR = CYR - YR$ $CYI = CYI - YI$	$CZR = CZR + ZI$ $CZI = CZI - ZR$	
$DWR = DWR + WR$ $DWI = DWI + WI$	$DXR = DXR - XI$ $DXI = DXI + XR$	$DYR = DYR - YR$ $DYI = DYI - YI$	$DZR = DZR + ZI$ $DZI = DZI - ZR$	

FIG. 81

C7

$AWR = A VR - WI$ $AWI = AWI + WR$	$AXR = AXR - XR$ $AXI = AXI - XI$	$AYR = AYR + YI$ $AYI = AYI - YR$	$AZR = AZR - ZR$ $AZI = AZI + ZI$	2632
$BWR = BWR - WI$ $BWI = BWI + WR$	$BXR = BXR - XR$ $BXI = BXI - XI$	$BYR = BYR + YI$ $BYI = BYI - YR$	$BZR = BZR - ZR$ $BZI = BZI + ZI$	2800
$CWR = CWR - WI$ $CWI = CWI + WR$	$CXR = CXR - XR$ $CXI = CXI - XI$	$CYR = CYR + YI$ $CYI = CYI - YR$	$CZR = CZR - ZR$ $CZI = CZI + ZI$	
$DWR = DWR - WI$ $DWI = DWI + WR$	$DXR = DXR - XR$ $DXI = DXI - XI$	$DYR = DYR + YI$ $DYI = DYI - YR$	$DZR = DZR - ZR$ $DZI = DZI + ZI$	

FIG. 82

THIS TABLE SHOWS THE ORDER OF CALCULATION FOR A TRANSPOSED BUTTERFLY:

C0

$AWR = WR + XR + YR + ZR$	$AXR = WR - XI - YR + ZI$	$AYR = WR - XR + YR - ZR$	$AZR = WR + XI - YR - ZI$
$AWI = WI + XI + YI + ZI$	$AXI = WI + XR - YI - ZR$	$AYI = WI - XI + YI - ZI$	$AZI = WI - XR - YI + ZR$
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-

2810



C1

$AWR = AWR - (WI + XI + YI + ZI)$	$AXR = AXR - (WI + XR - YI - ZR)$	$AYR = AYR - (WI - XI + YI - ZI)$	$AZR = AZR - (WI - XR - YI + ZR)$
$AWI = AWI + (WR + XR + YR + ZR)$	$AXI = AXI + (WR - XI - YR + ZI)$	$AYI = AYI + (WR - XR + YR - ZR)$	$AZI = AZI + (WR + XI - YR - ZI)$
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-

2810

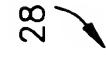


FIG. 83

2632

$AWR = WR + XI - YR - ZI$	$AXR = WR - XI + YI - ZR$	$AYR = WR - XR + YR - ZR$	$AZR = WR + XI - YR - ZI$
$AWI = WI - XR - YI + ZR$	$AXI = WI - XI - YR + ZI$	$AYI = WI - XR - YI + ZR$	$AZI = WI - XI + YR - ZI$
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-



FIG. 84

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C2

-	-	-	-	-	-
$BWR = WR + XR + YR + ZR$	$BXR = WR - XI - YR + ZI$	$BYR = WR - XR + YR - ZR$	$BZR = WR + XI - YR - ZI$		2810
$BWI = WI + XI + YI + ZI$	$BXI = WI + XR - YI - ZR$	$BYI = WI - XI + YI - ZI$	$BZI = WI - XR - YI + ZR$		2632
-	-	-	-	-	
-	-	-	-	-	
-	-	-	-	-	
-	-	-	-	-	

FIG. 85

C3

-	-	-	-	-	-
$BWR = BWR - (WI + XI + YI + ZI)$	$BXR = BXR - (WI + XR - YI - ZR)$	$BYR = BYR - (WI - XI + YI - ZI)$	$BZR = BZR - (WI - XR - YI + ZR)$		2810
$BWI = BWI + (WR + XR + YR + ZR)$	$BXI = BXI + (WR - XI - YR + ZI)$	$BYI = BYI + (WR - XR + YR - ZR)$	$BZI = BZI + (WR + XI - YR - ZI)$		2632
-	-	-	-	-	
-	-	-	-	-	
-	-	-	-	-	
-	-	-	-	-	

FIG. 86

FIG. 87

C4	2632	2810
-	-	-
-	-	-
-	-	-
-	-	-
$CWR = WR + XR + YR + ZR$	$CXR = WR - XI - YR + ZI$	$CYR = WR - XR + YR - ZR$
$CWI = WI + XI + YI + ZI$	$CXI = WI + XR - YI - ZR$	$CYI = WI - XI + YI - ZI$
-	-	-
-	-	-

FIG. 87

C5	2632	2810
-	-	-
-	-	-
-	-	-
-	-	-
$CWR = CWR - (WI + XI + YI + ZI)$	$CXR = CXR - (WI + XI - YI - ZR)$	$CYR = CYR - (WI - XI - YI - ZI)$
$CWI = CWI + (WR + XR + YR + ZR)$	$CXI = CXI + (WR - XI - YR + ZI)$	$CYI = CYI + (WR - XR + YR - ZR)$
-	-	-
-	-	-

FIG. 88

W₁ X₁ Y₁ Z₁ W₂ X₂ Y₂ Z₂ W₃ X₃ Y₃ Z₃ W₄ X₄ Y₄ Z₄

C6

-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
DWR = WR+XR+YR+ZR	DXR = WR-XI-YR+ZI	DYR = WR-XR+YR-ZR	DZR = WR+XI-YR-ZI	
DWI = WI+XI+YI+ZI	DXI = WI+XR-YI-ZR	DI = WI-XI+YI-ZI	DZI = WI-XR-YI+ZR	

2810

FIG. 89

-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
DWR = DWR-(WI+XI+YI+ZI)	DXR = DXR-(WI+XR-YI-ZR)	DYR = DYR-(WI-XI+YI-ZI)	DZR = DZR-(WI-XR-YI+ZR)	
DWI = DWI+(WR+XR+YR+ZR)	DXI = DXI+(WR-XI-YR+ZI)	DI = DI+(WR-XR+YR-ZR)	DZI = DZI+(WR+XI-YR-ZI)	

2632

FIG. 90

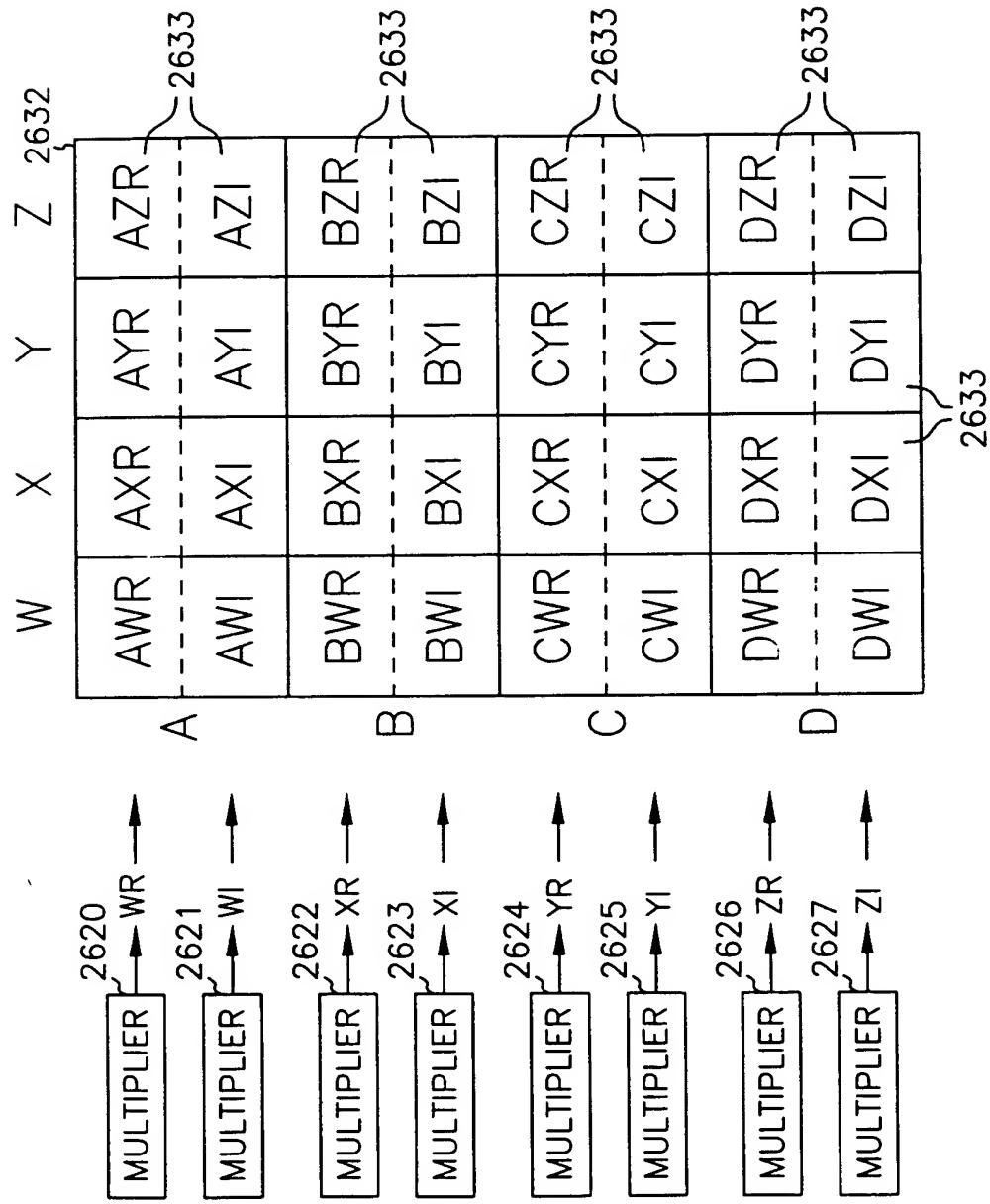


FIG. 91

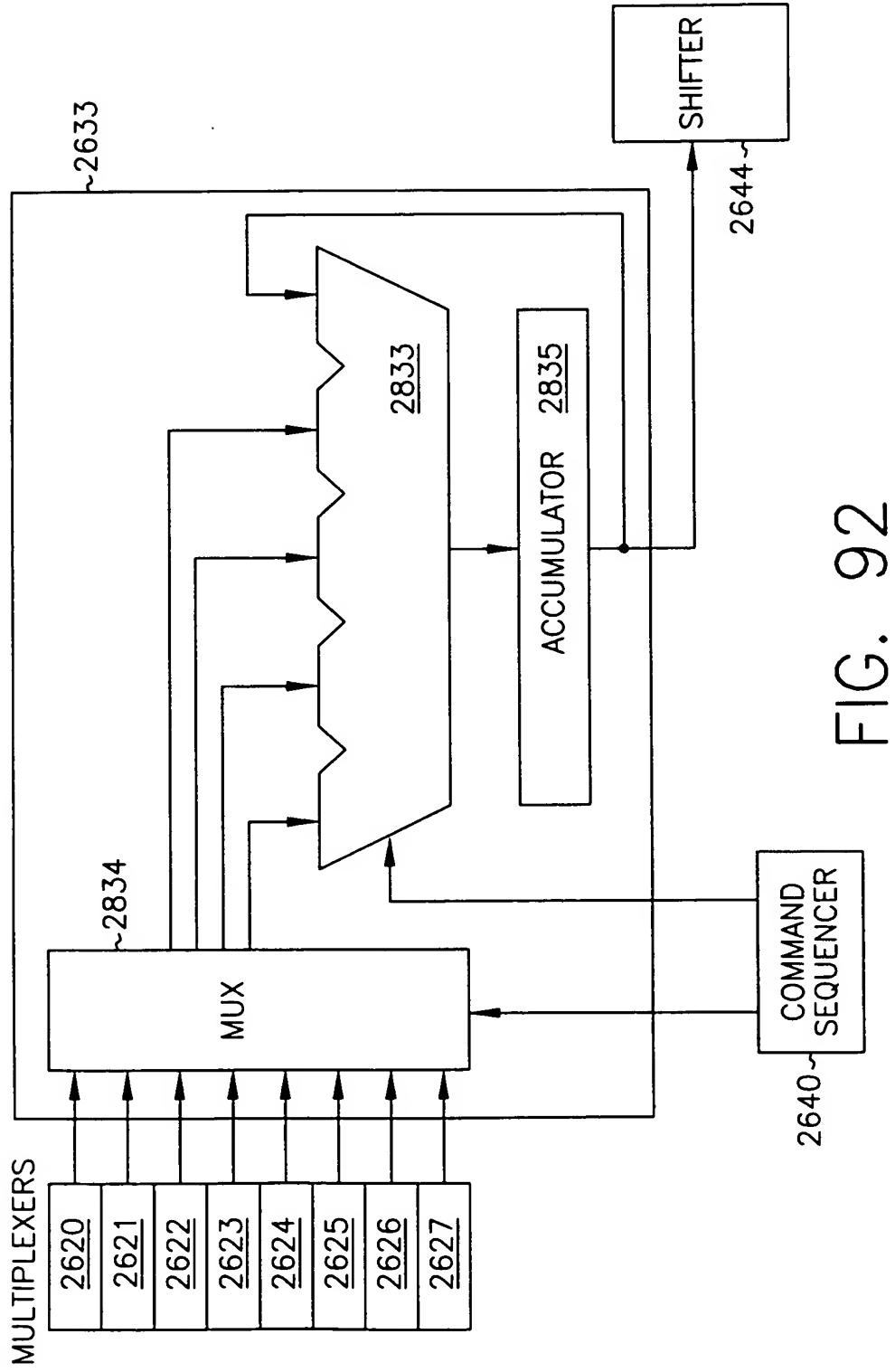


FIG. 92

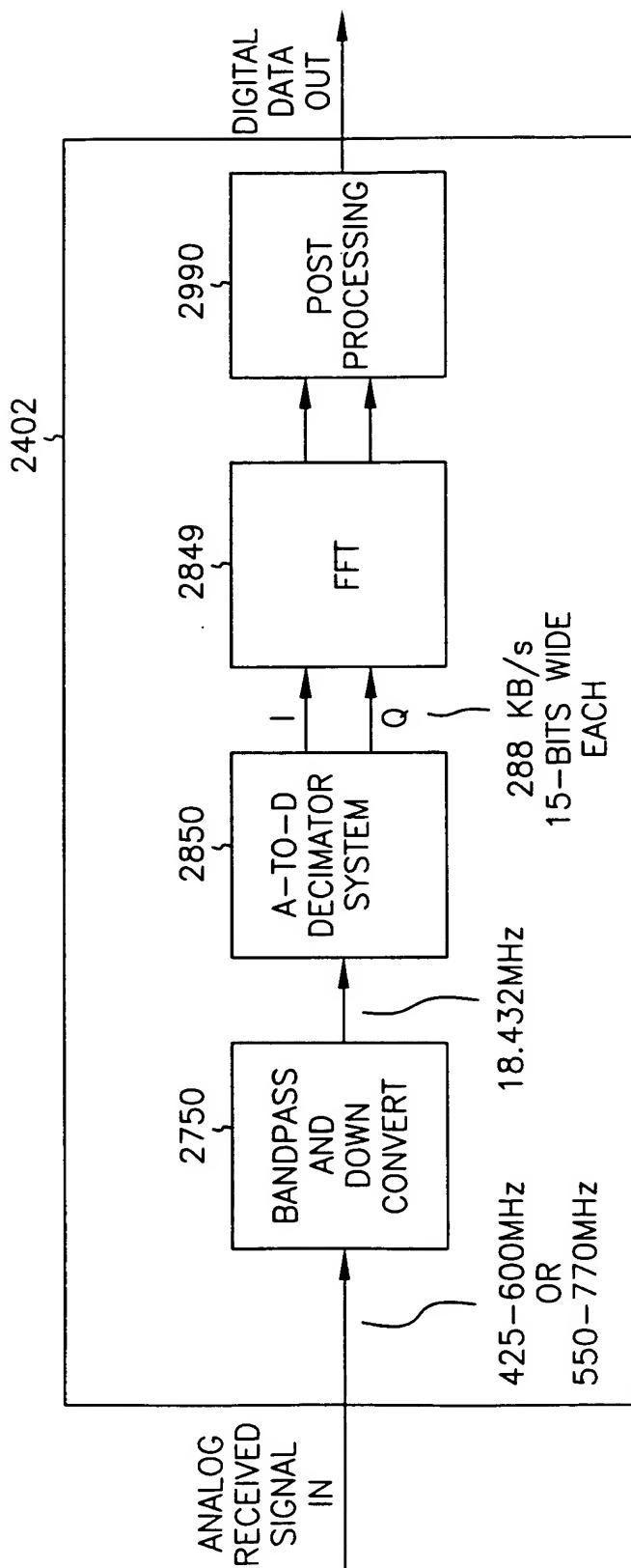


FIG. 93

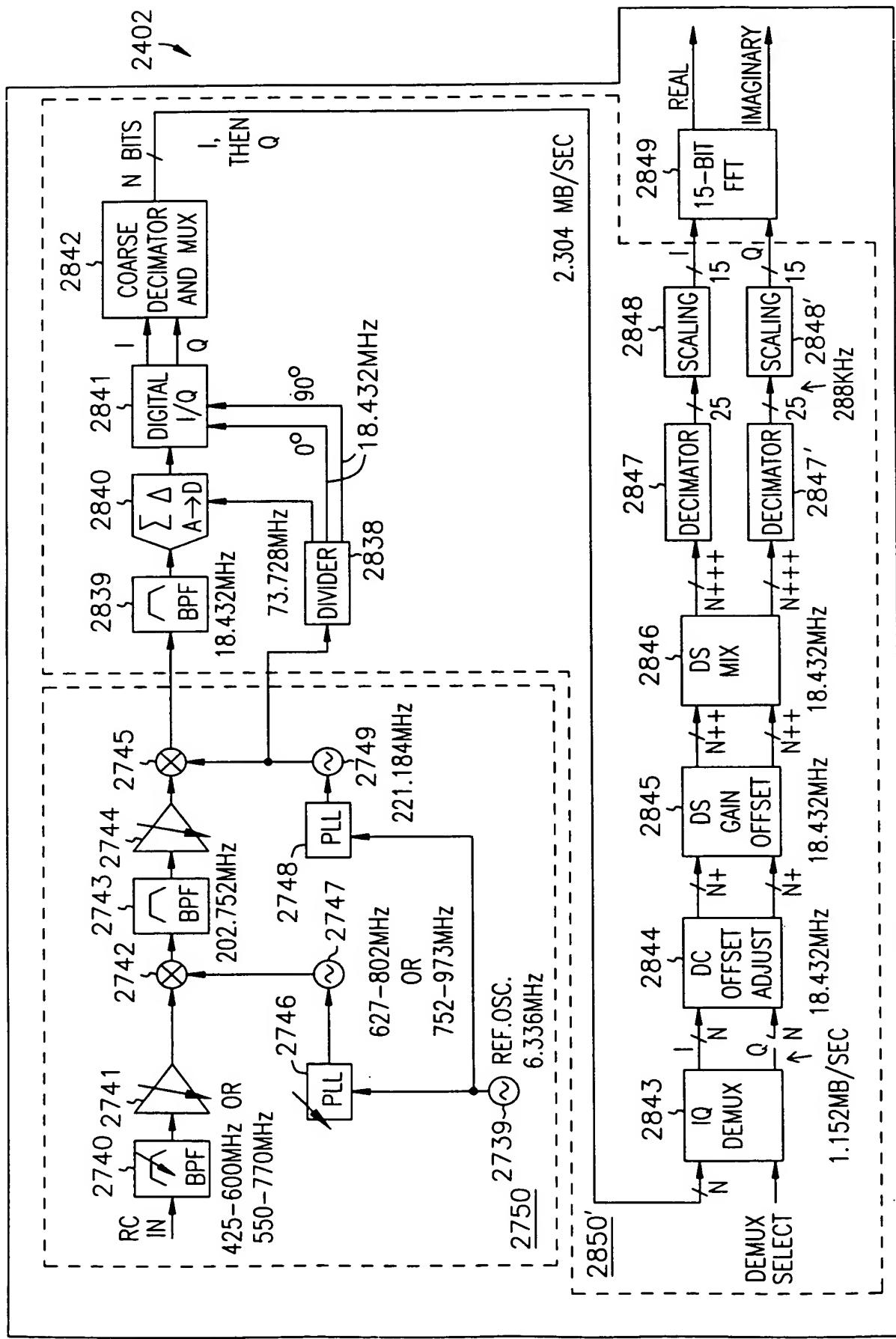


FIG. 94

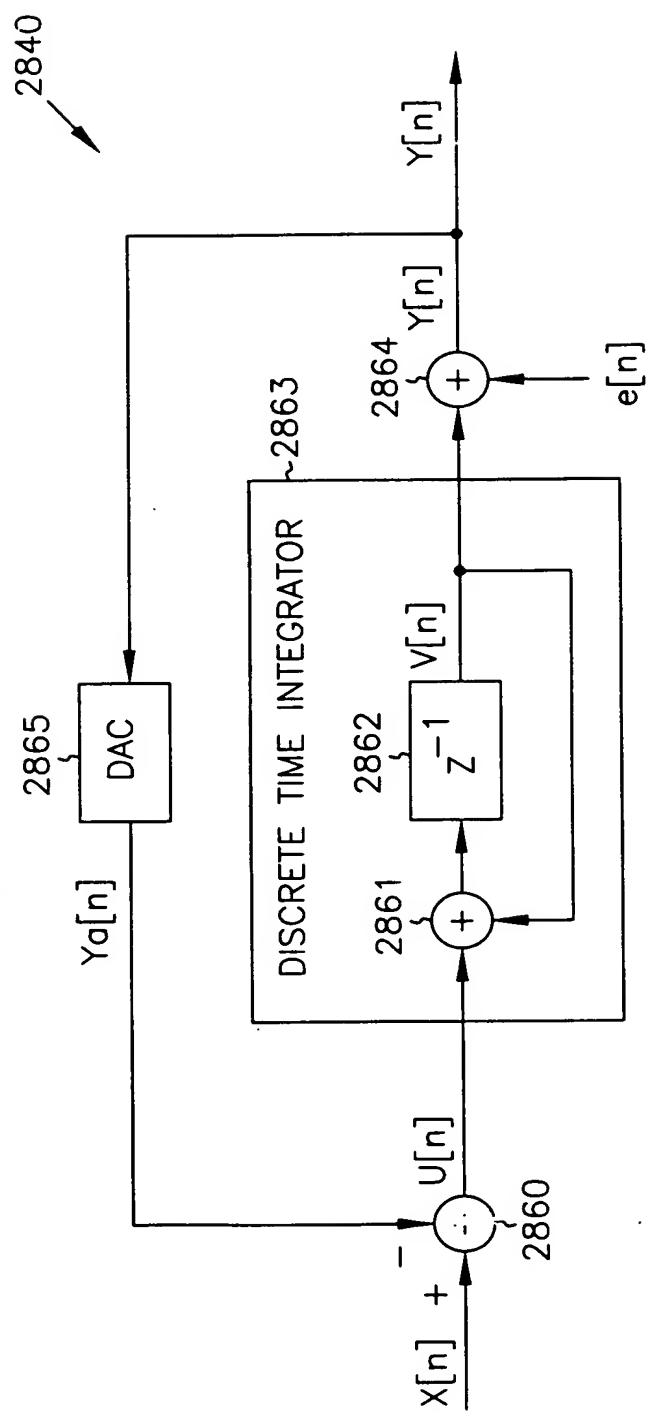


FIG. 95

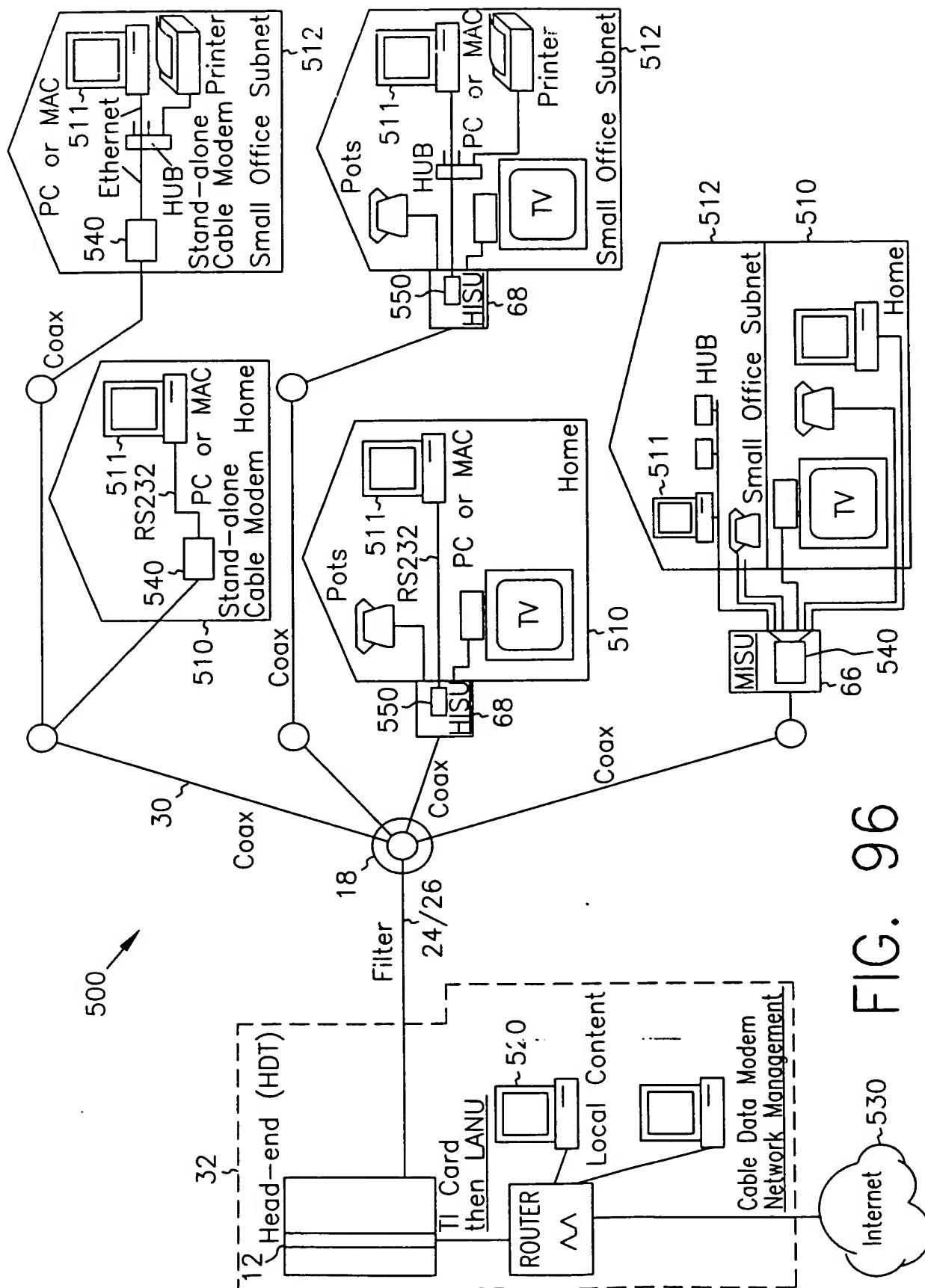
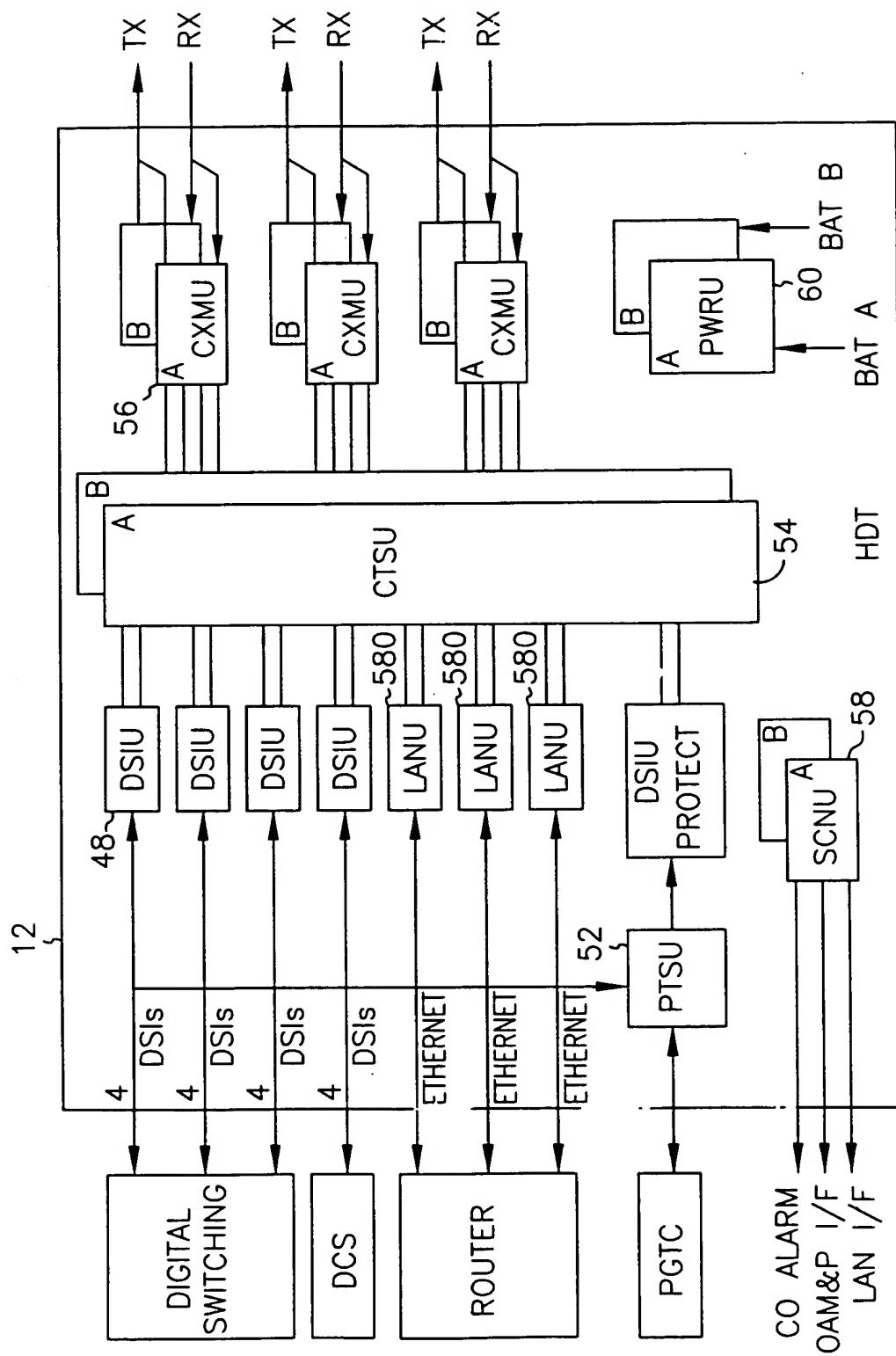


FIG. 96

Internet ~530

FIG. 97



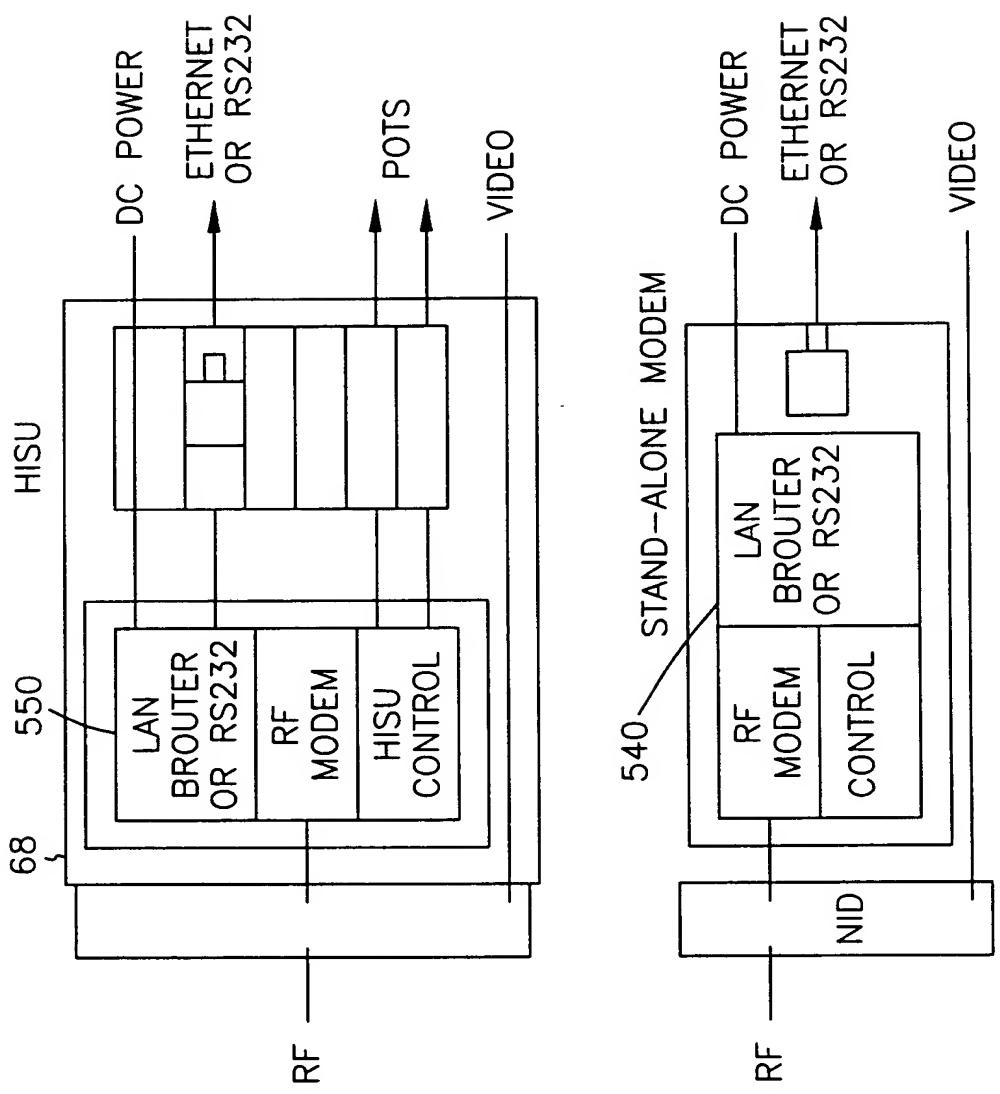


FIG. 98

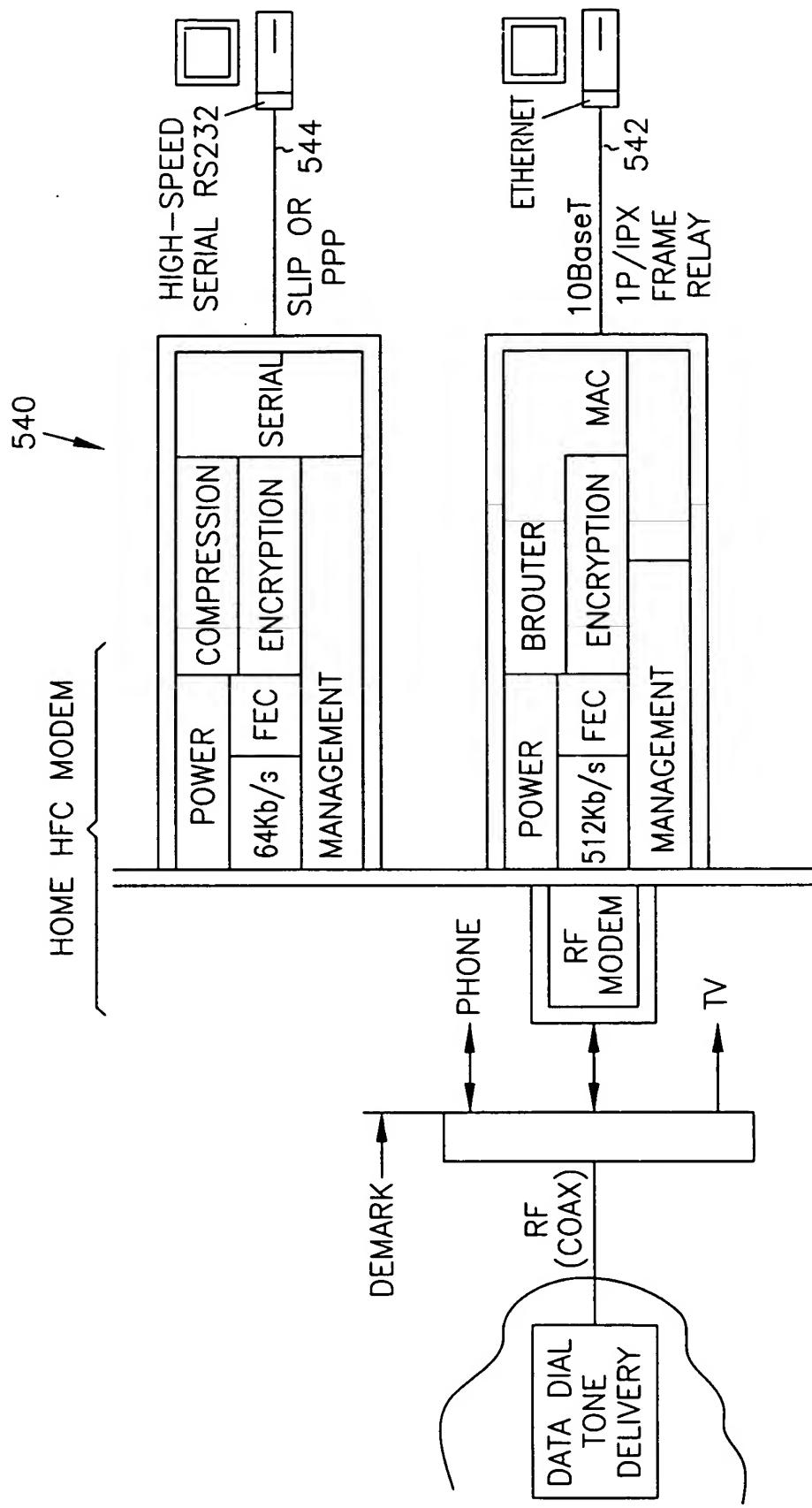


FIG. 99

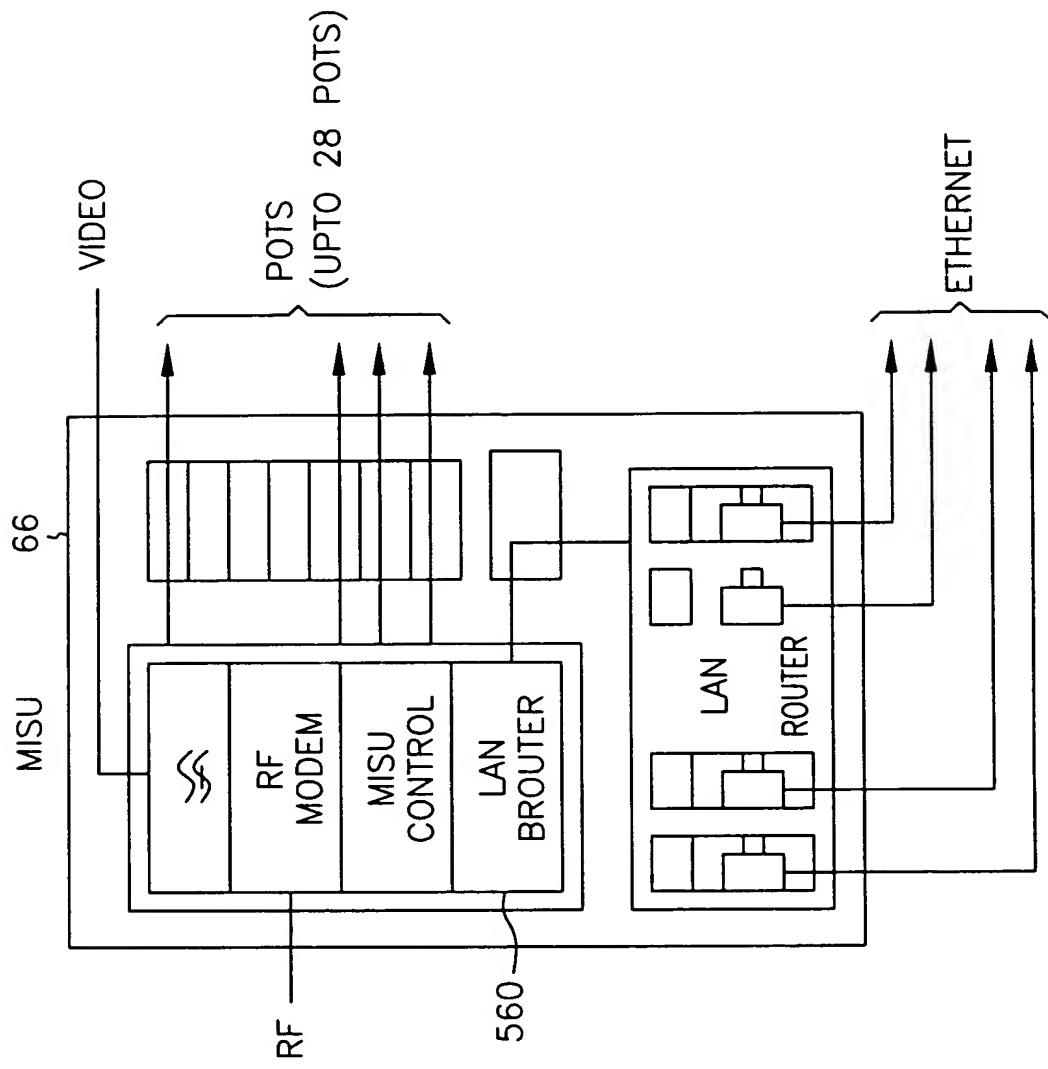
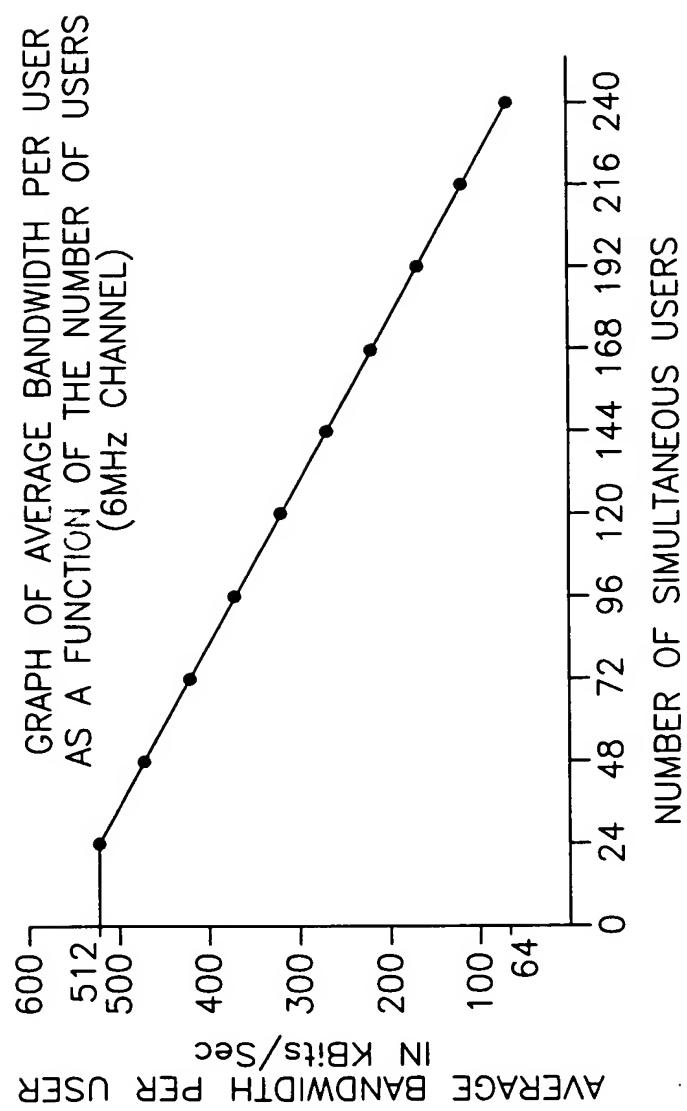


FIG. 100

FIG. 101



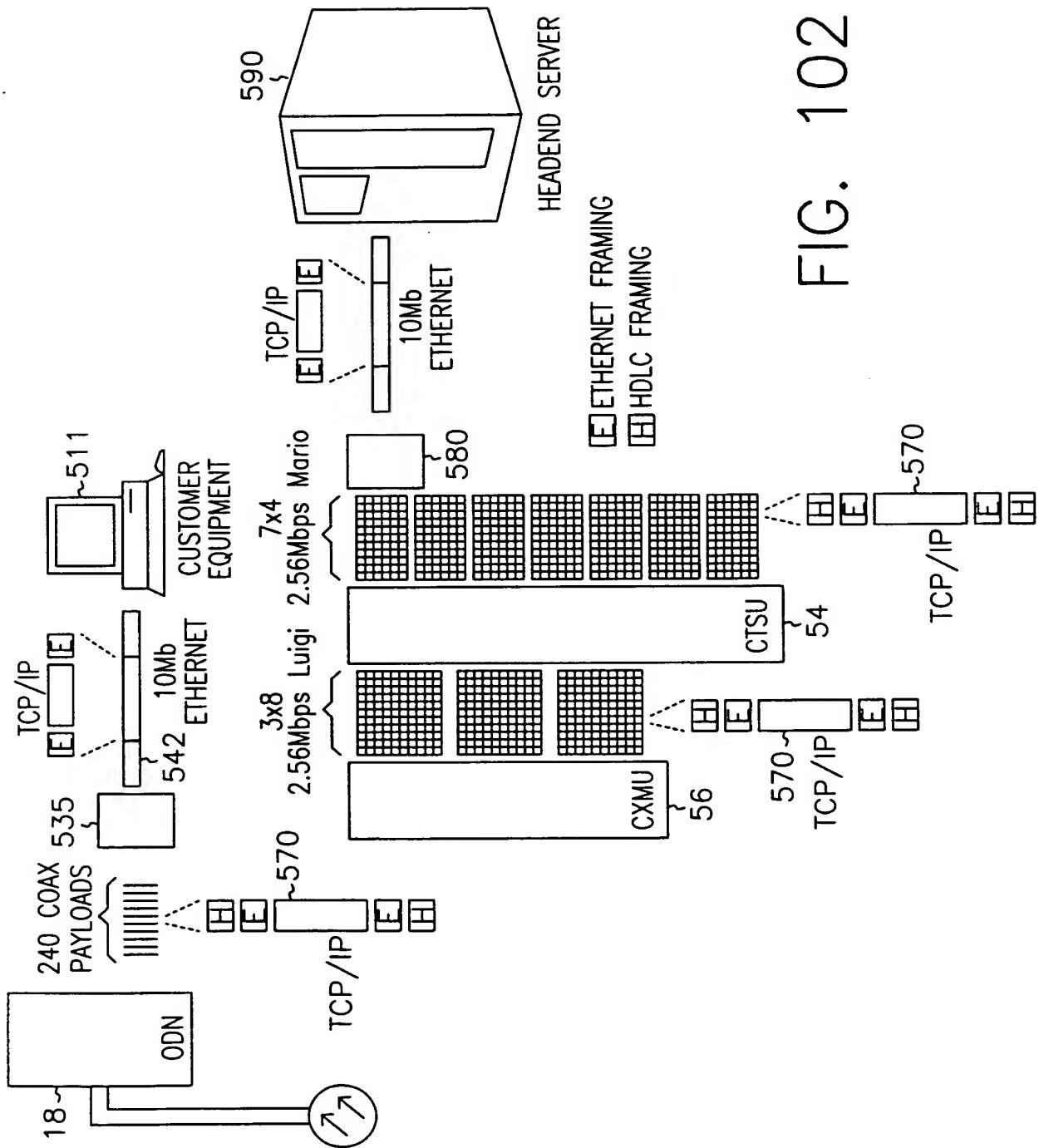


FIG. 102

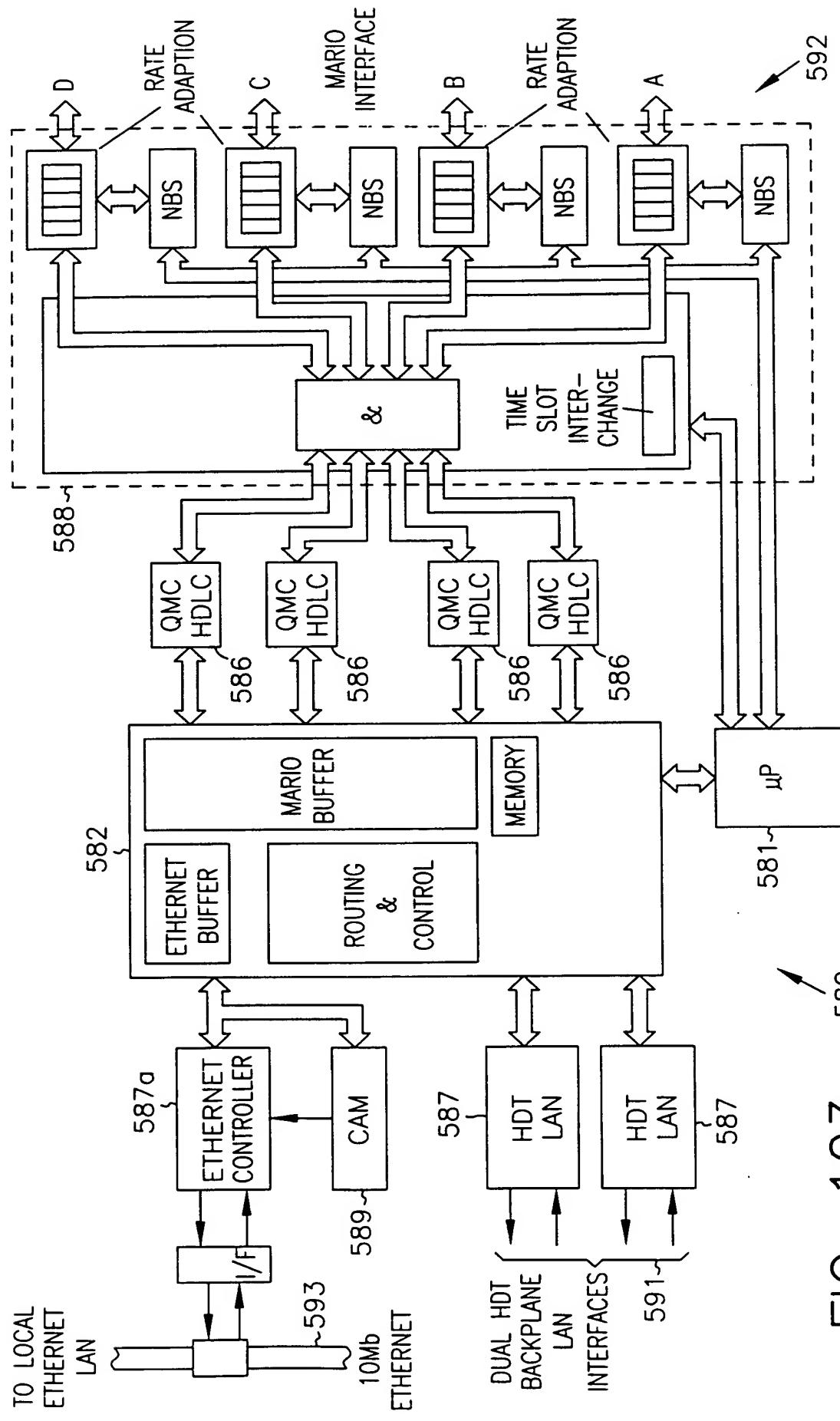


FIG. 103

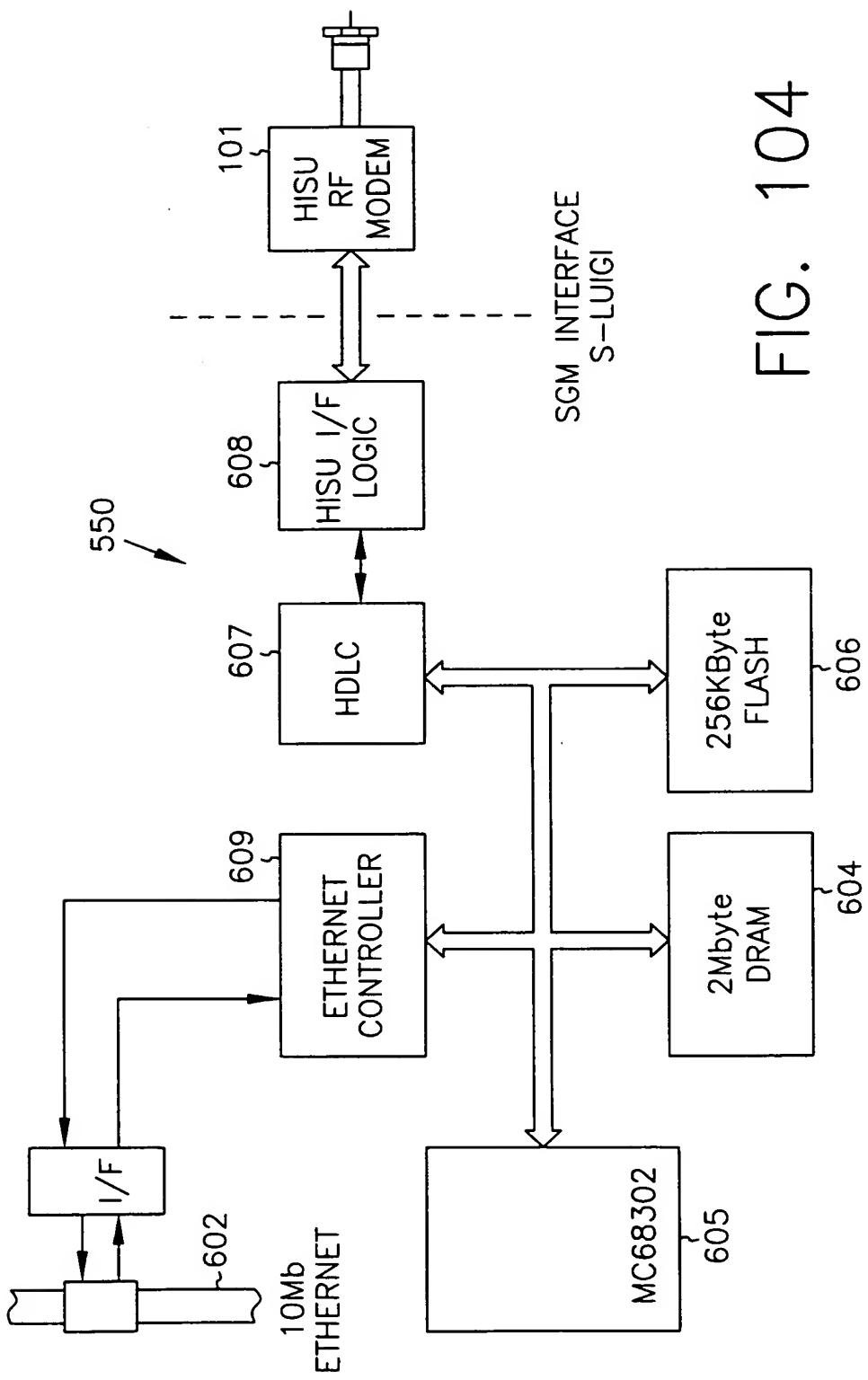


FIG. 104

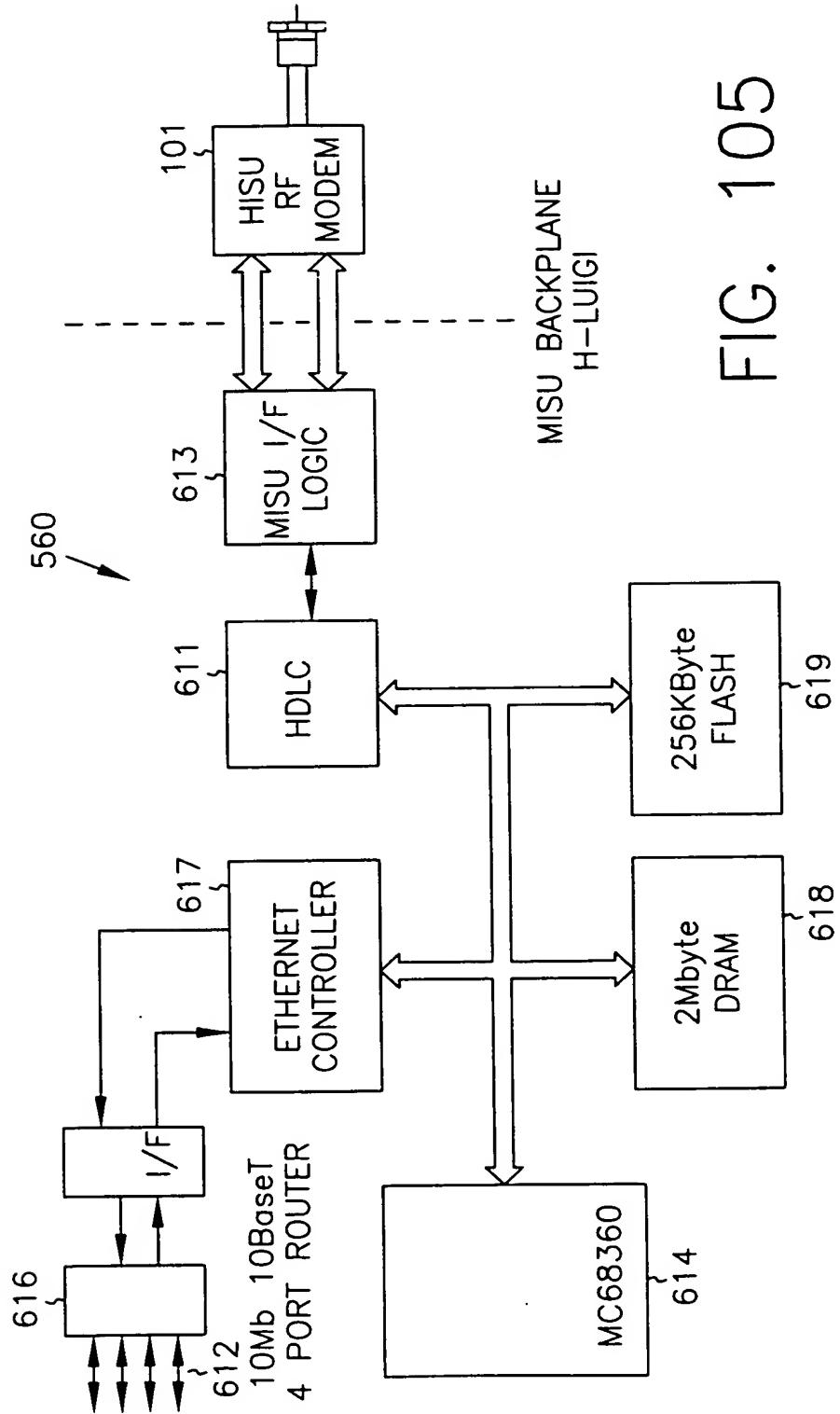


FIG. 105

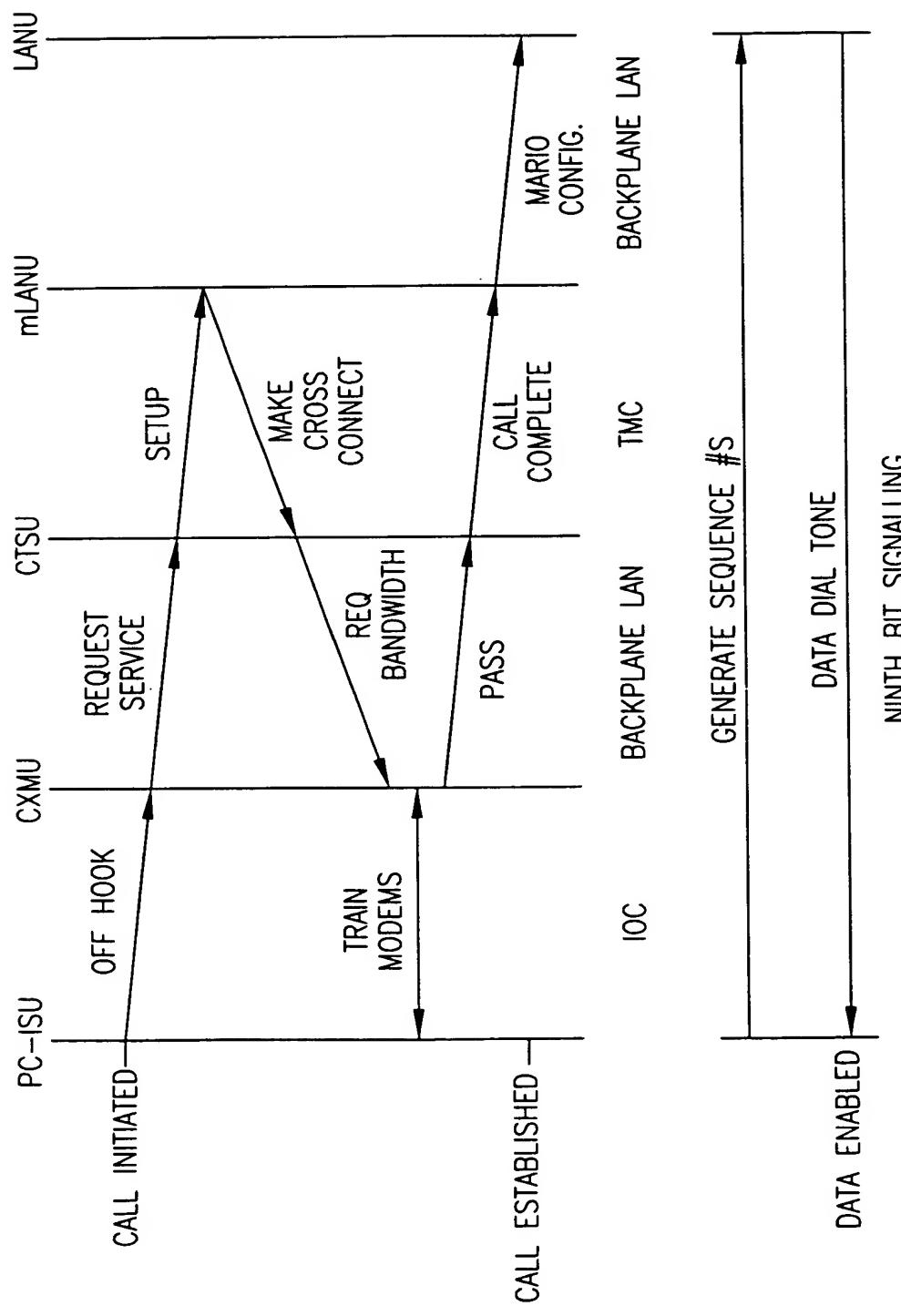
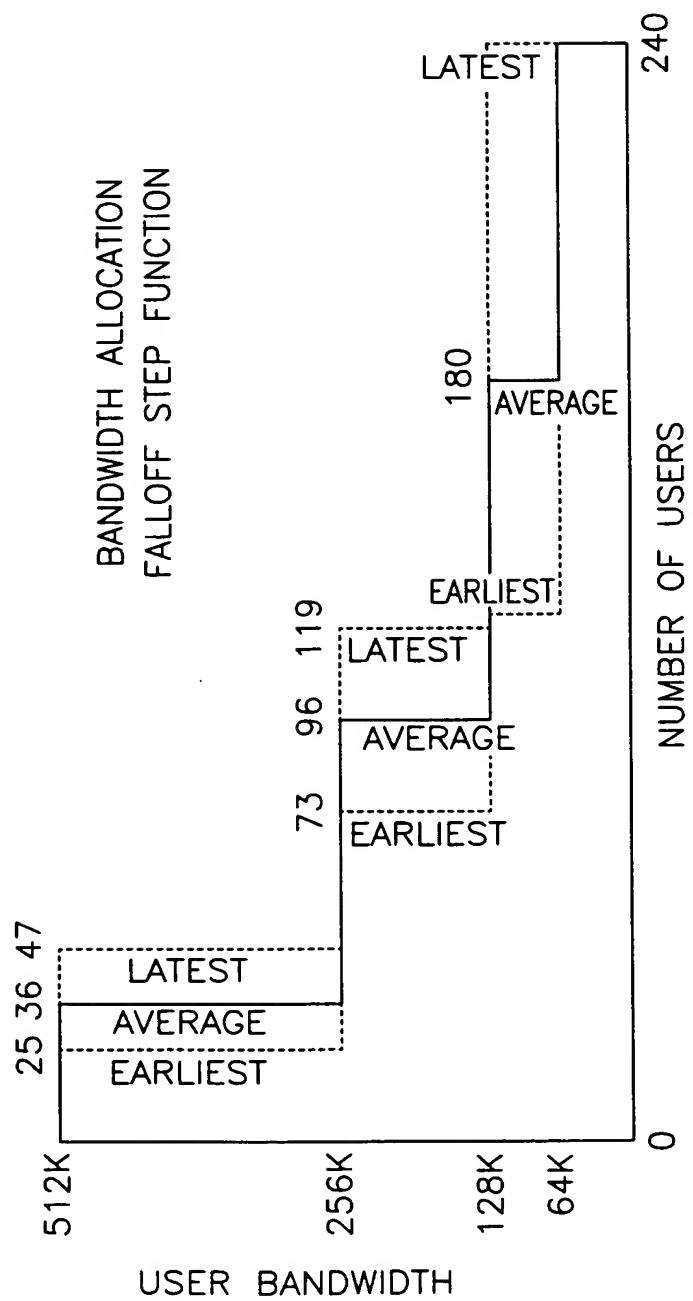


FIG. 106

FIG. 107



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

THE RF SPECTRUM OF 24 USERS WITH 512Kbs

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

ADDING THE 25th USER

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

ADDING THE 26th USER, ETC

FIG. 108

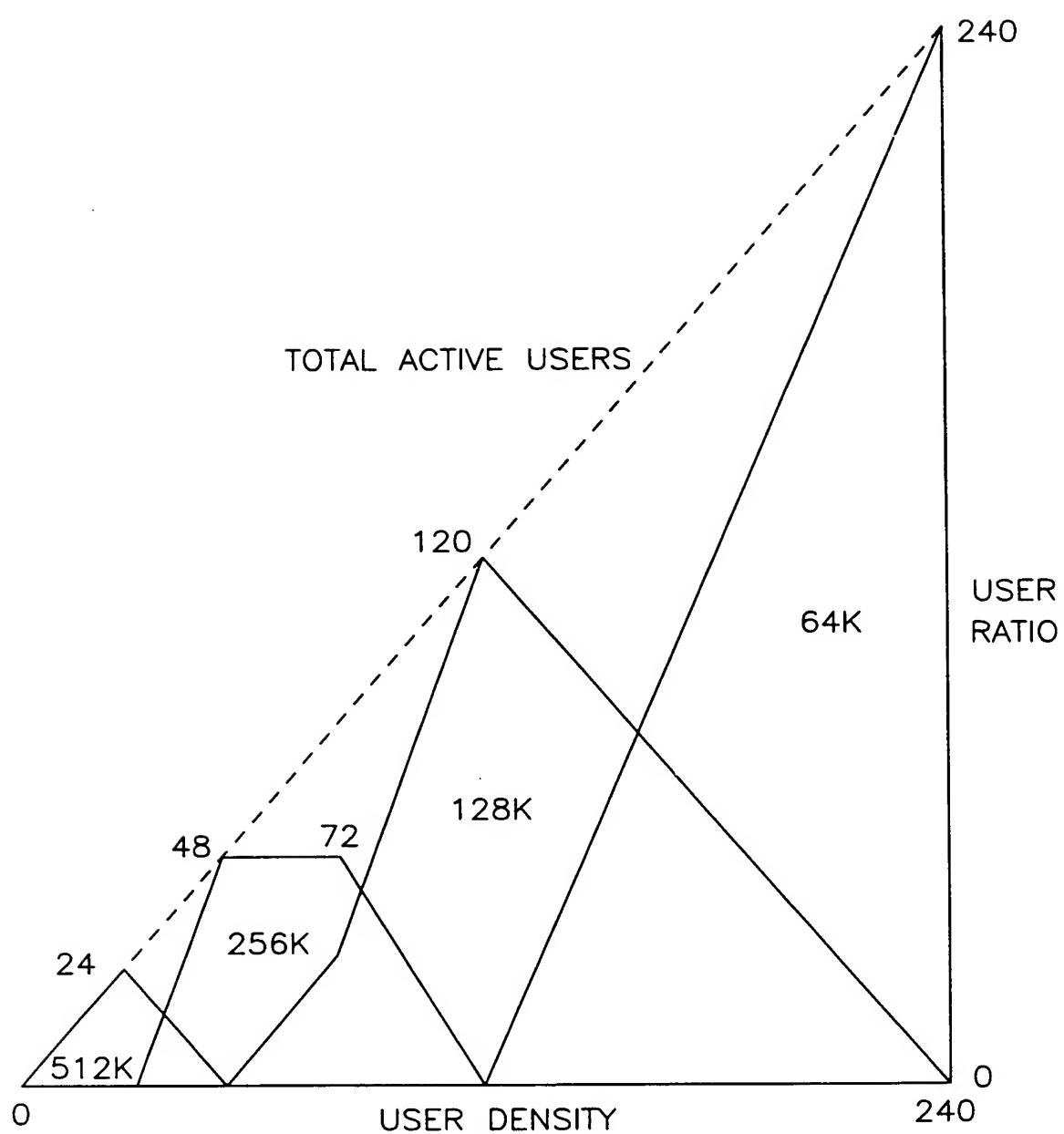


FIG. 109

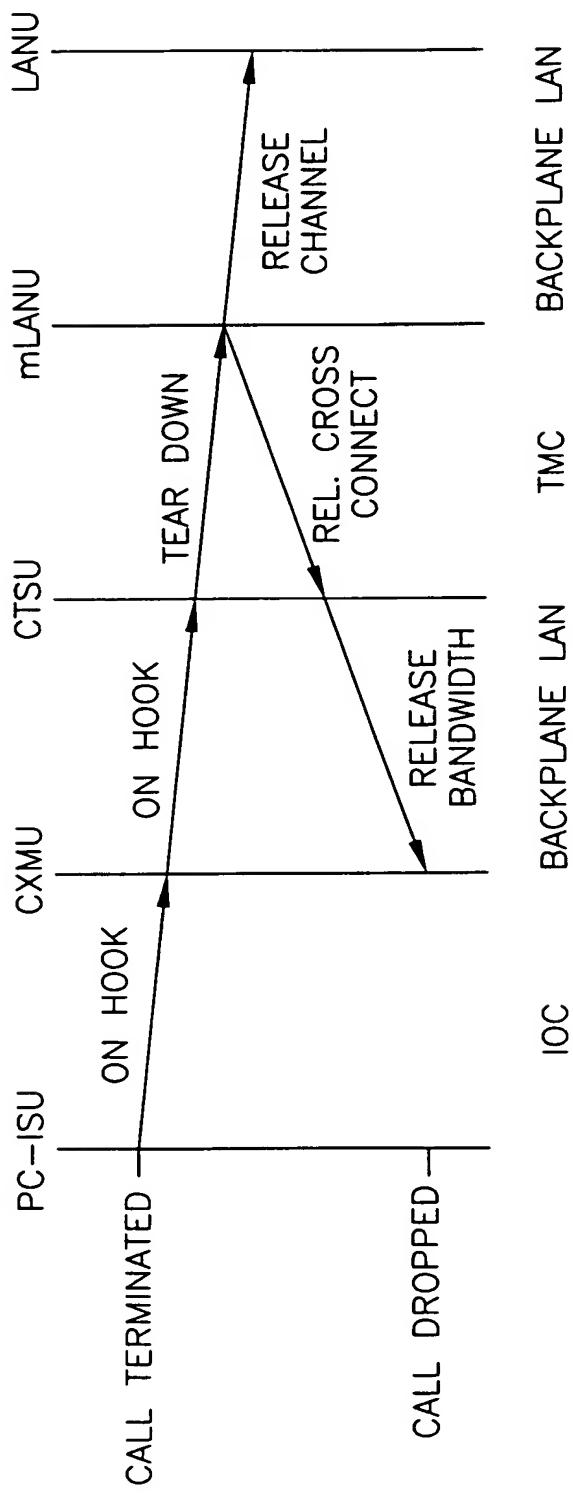


FIG. 110

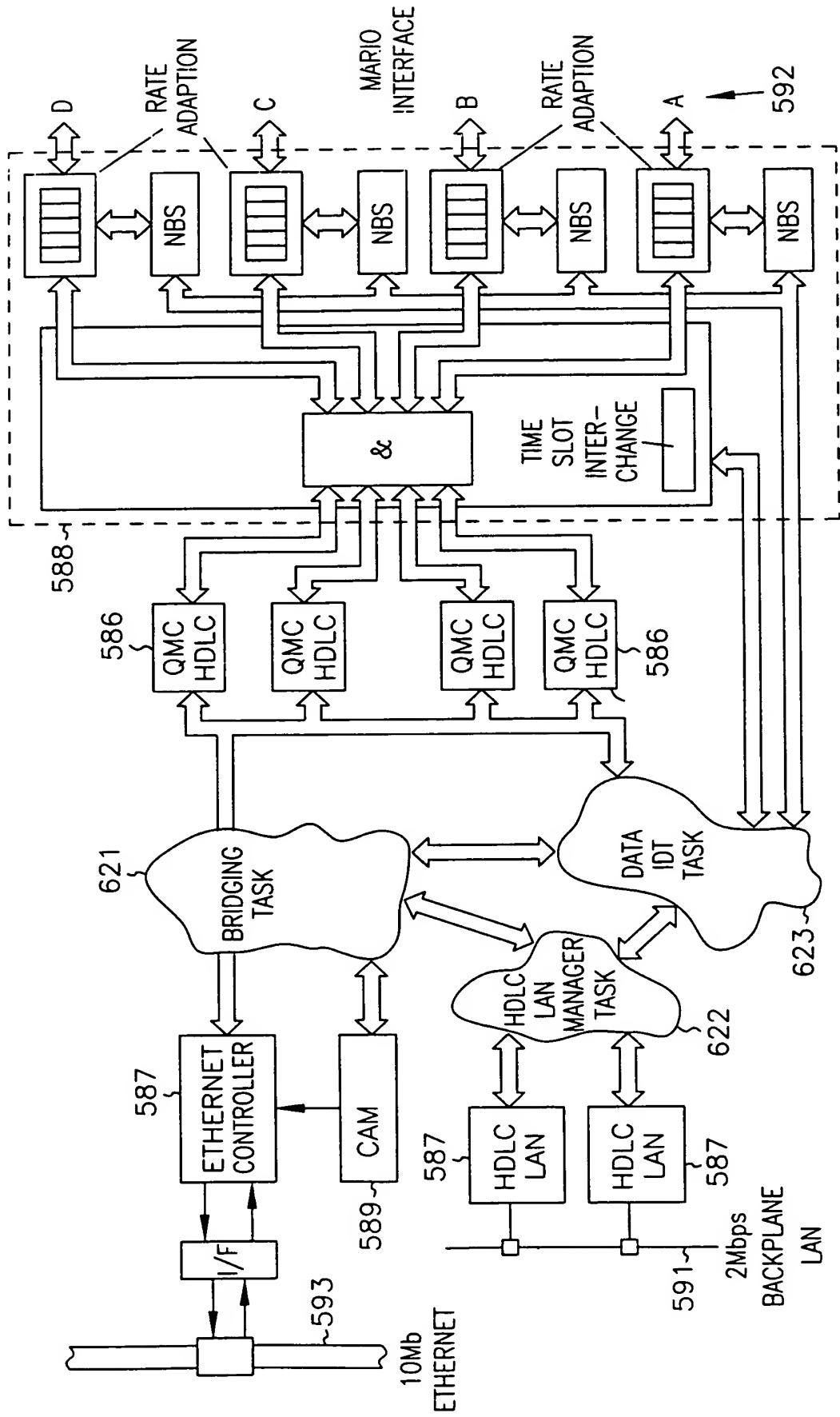
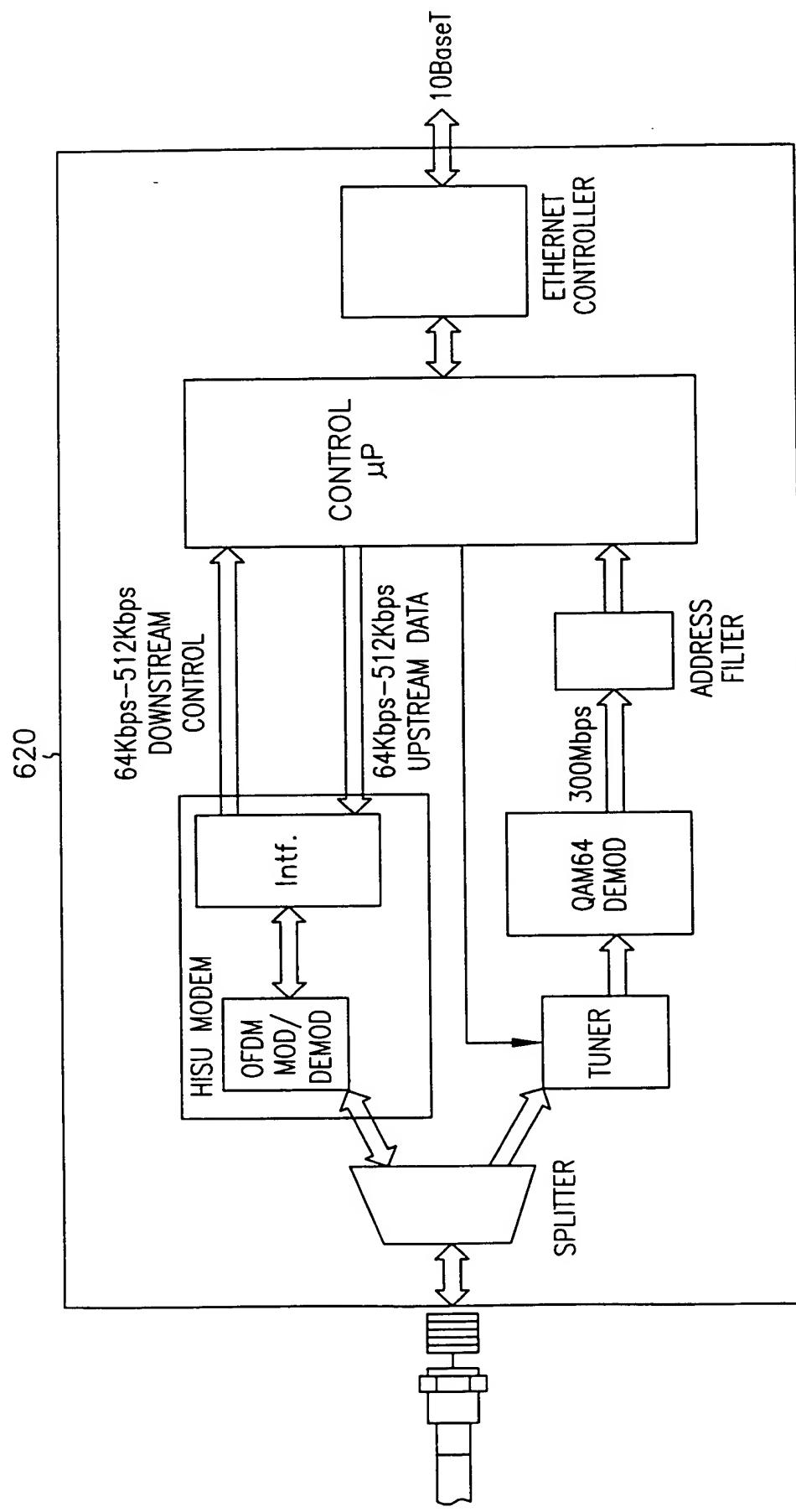


FIG. 111

620

FIG. 112



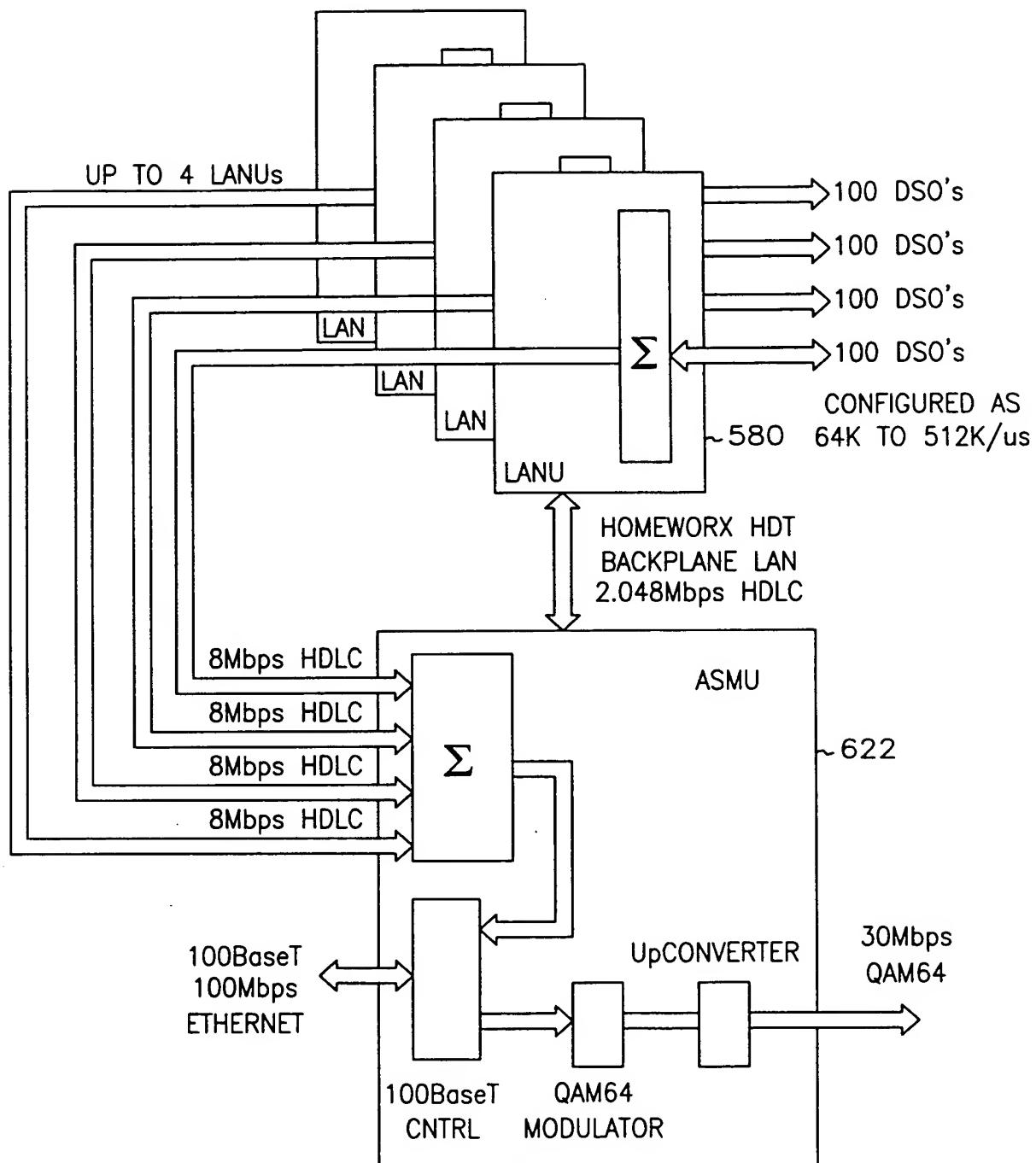
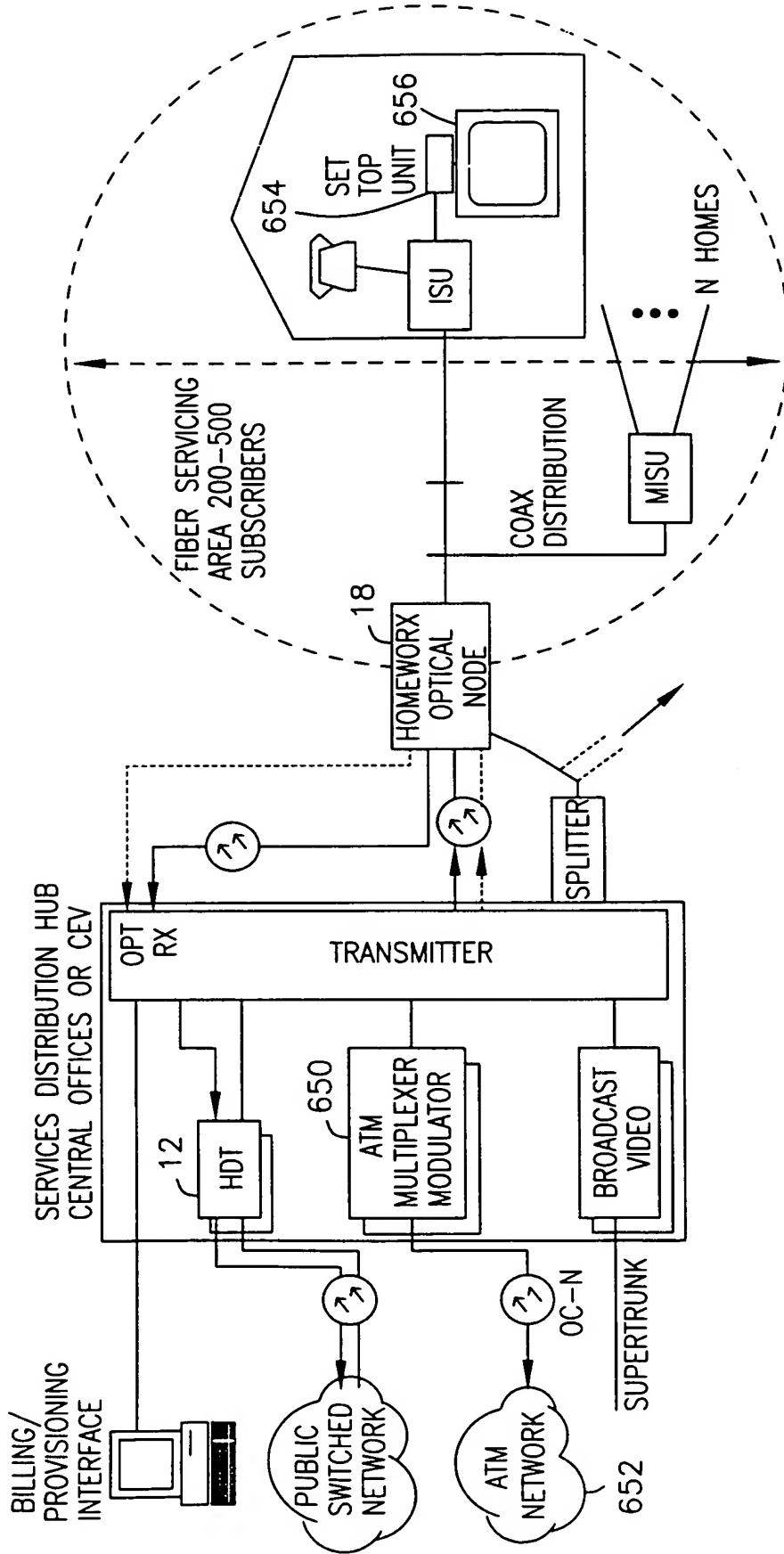


FIG. 113

FIG. 114



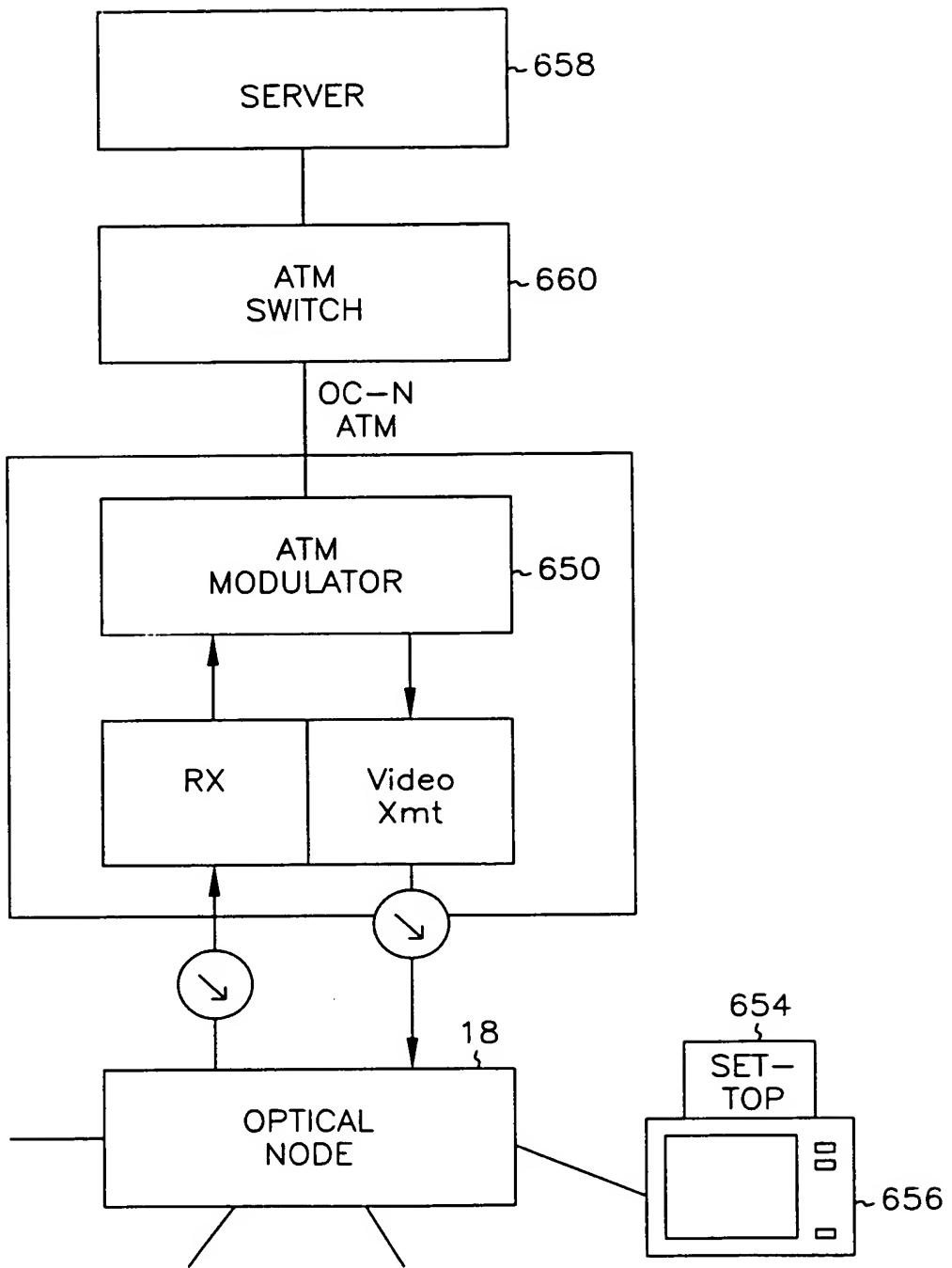


FIG. 115

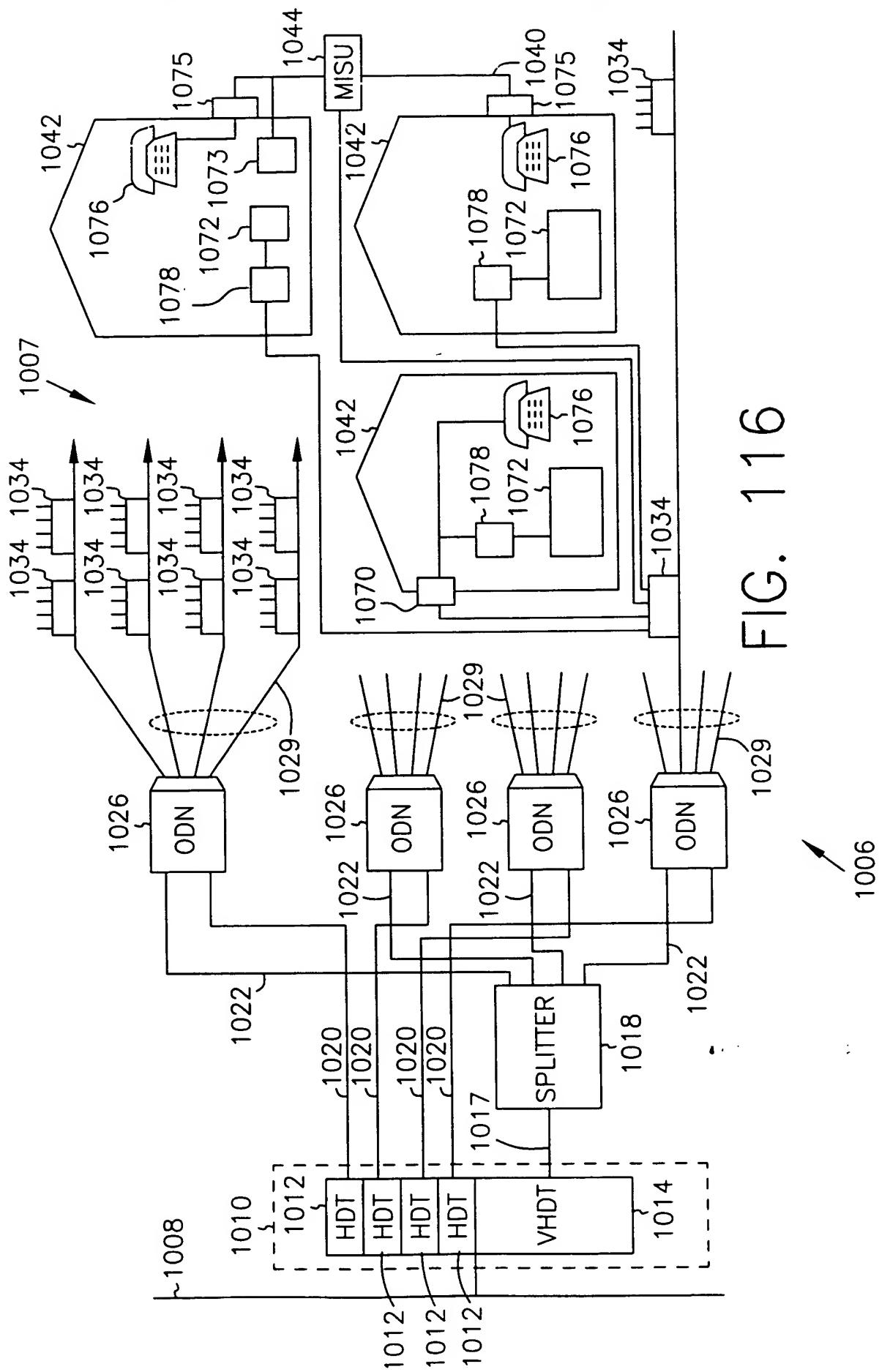


FIG. 116

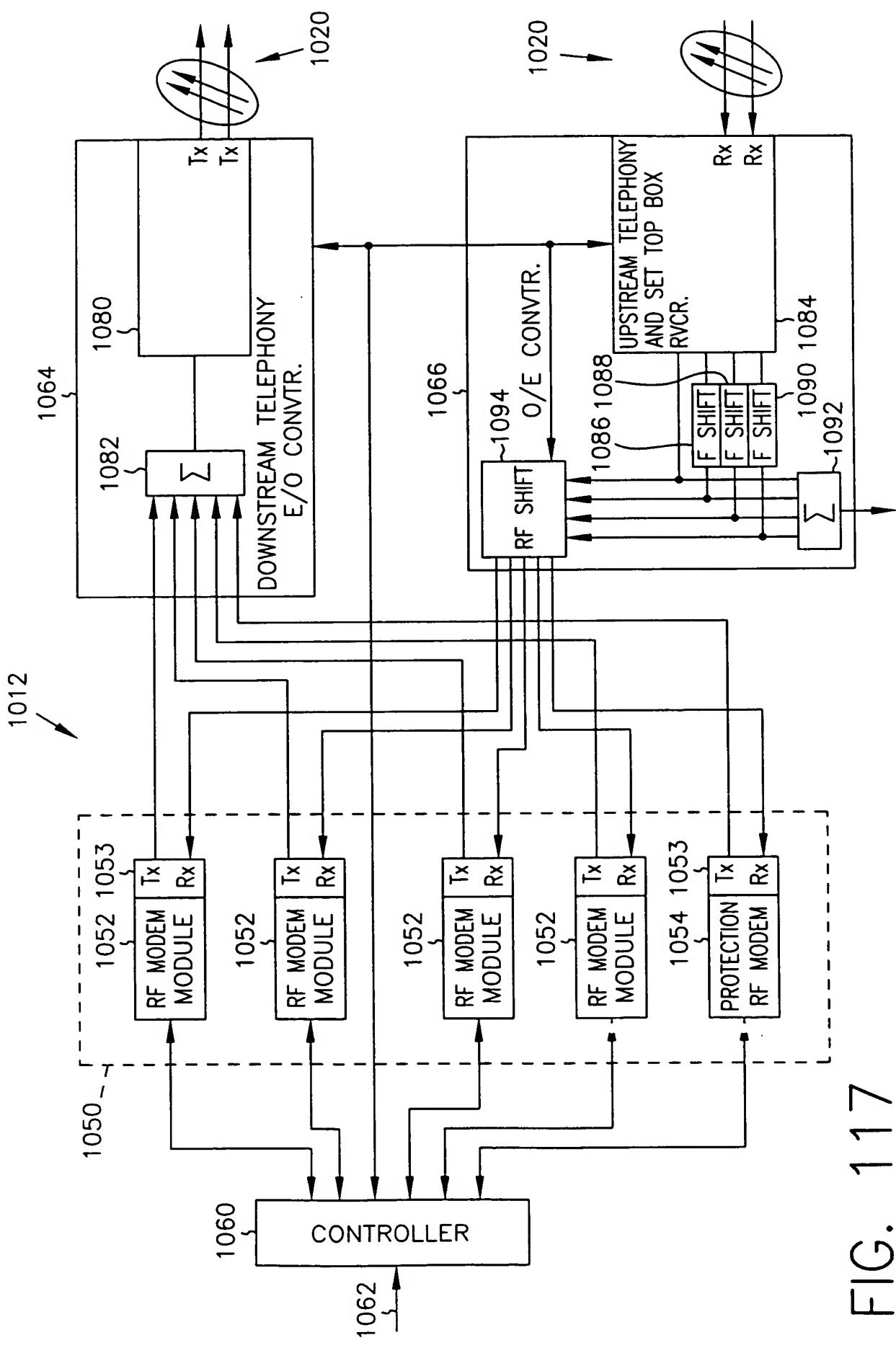


FIG. 117

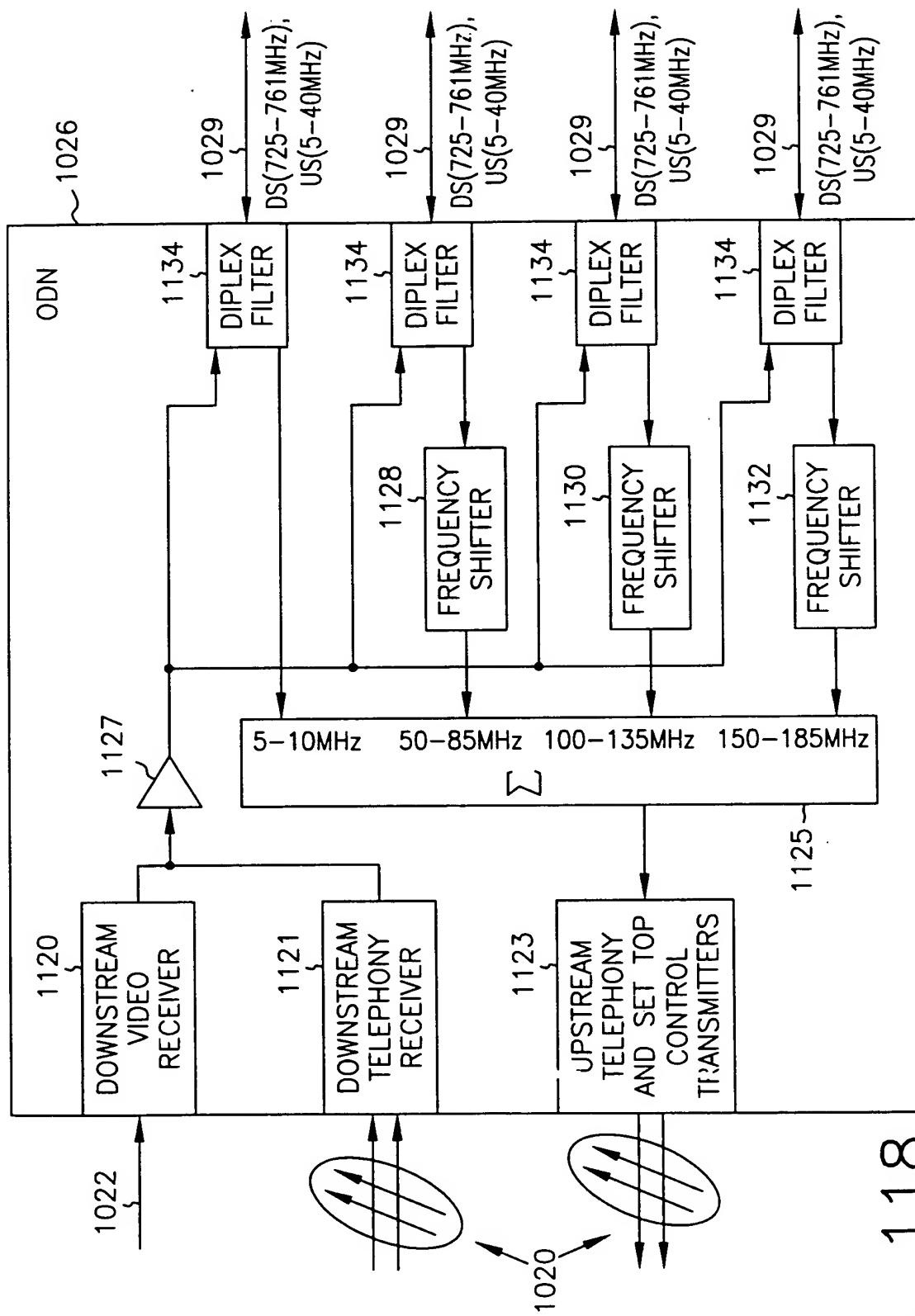


FIG. 118

FIG. 119

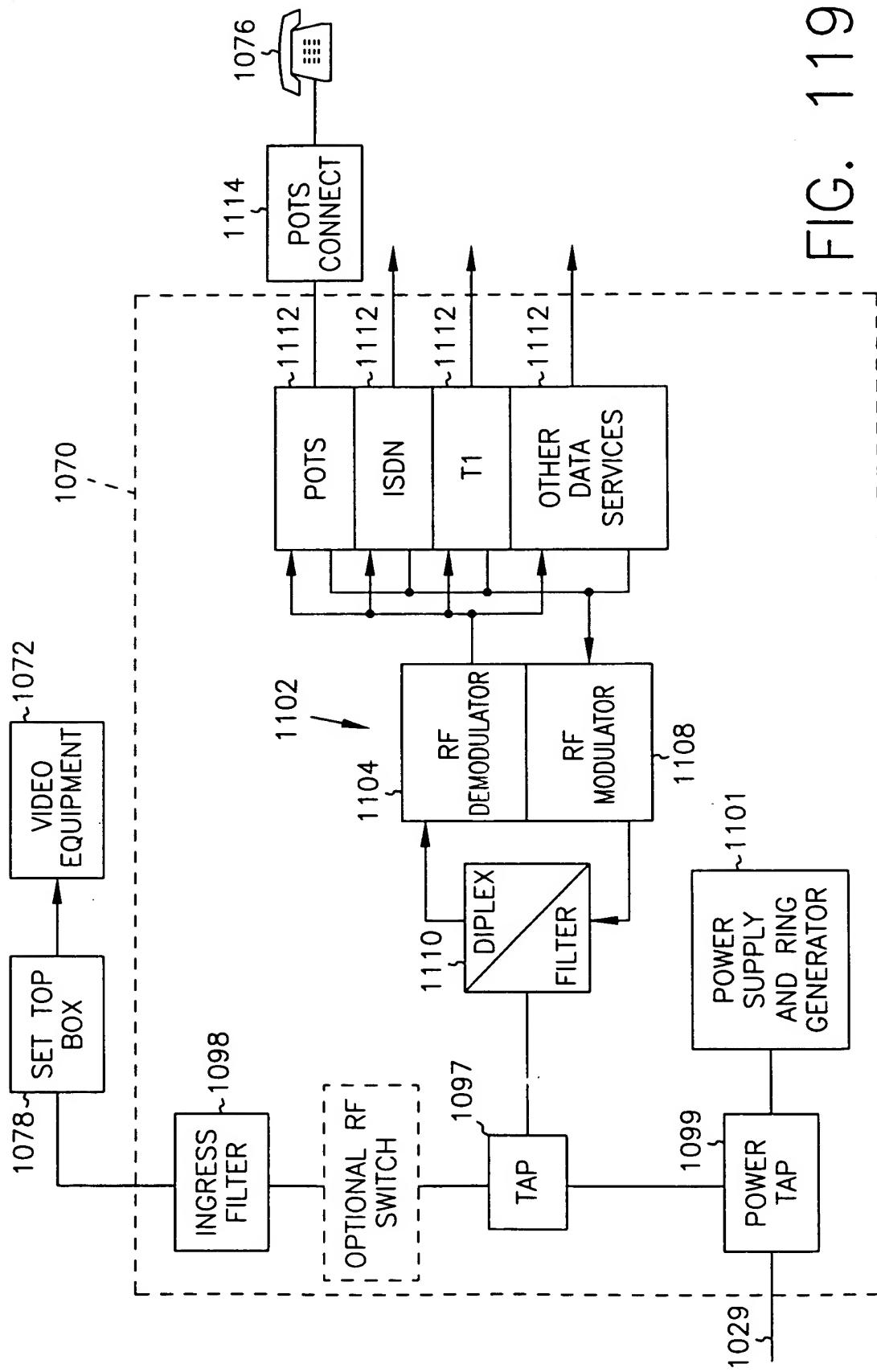
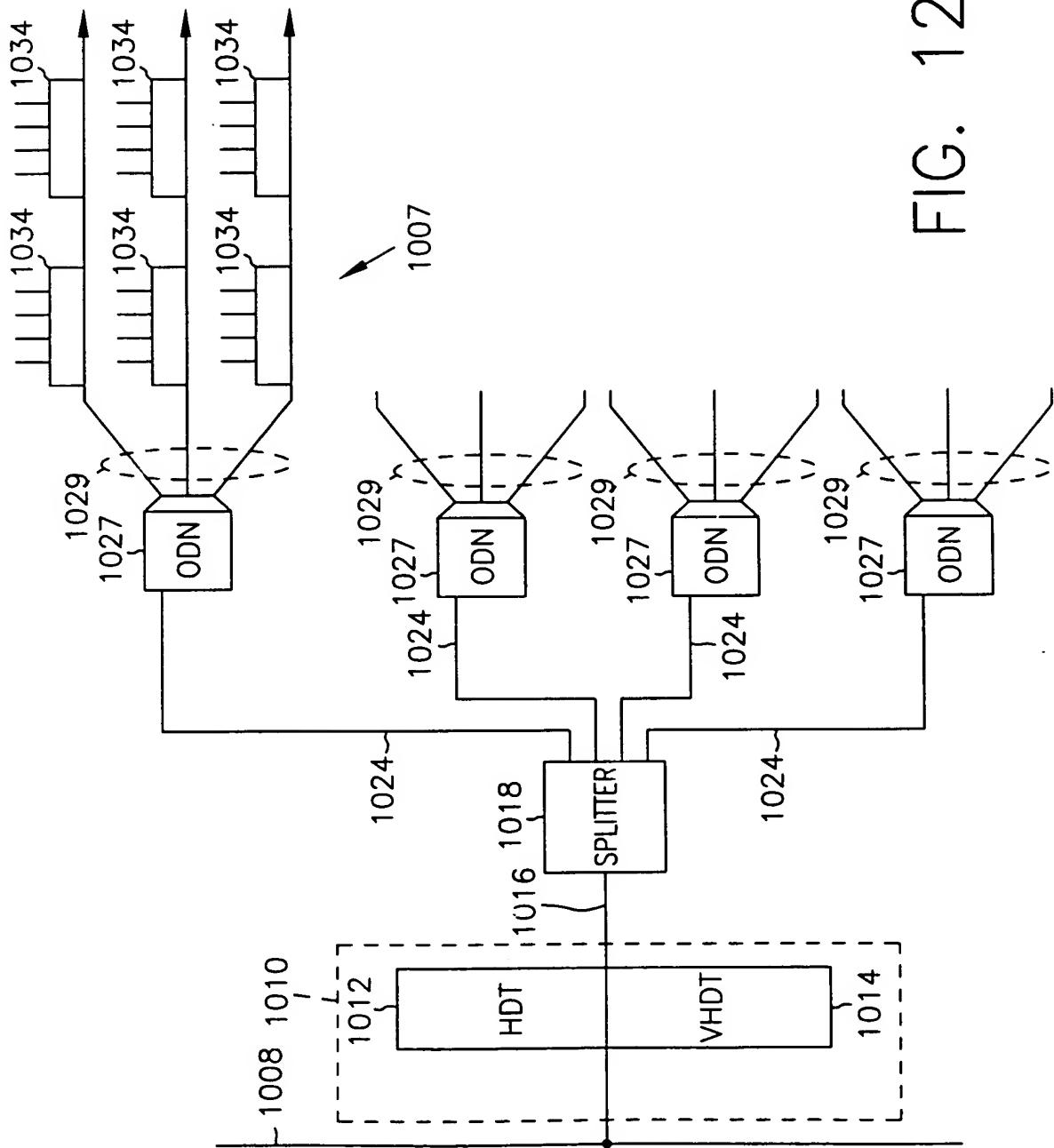


FIG. 120



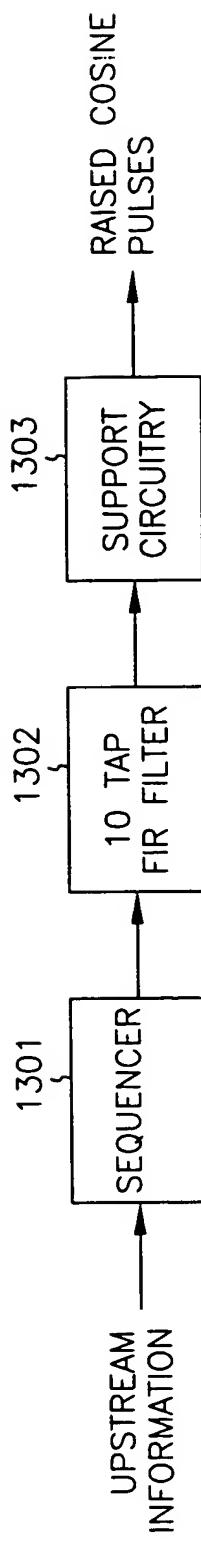


FIG. 121

ጊዜ የሚያስፈልግ ስርዓት በመሆኑ በቻ ምክንያት ይሰጣል.

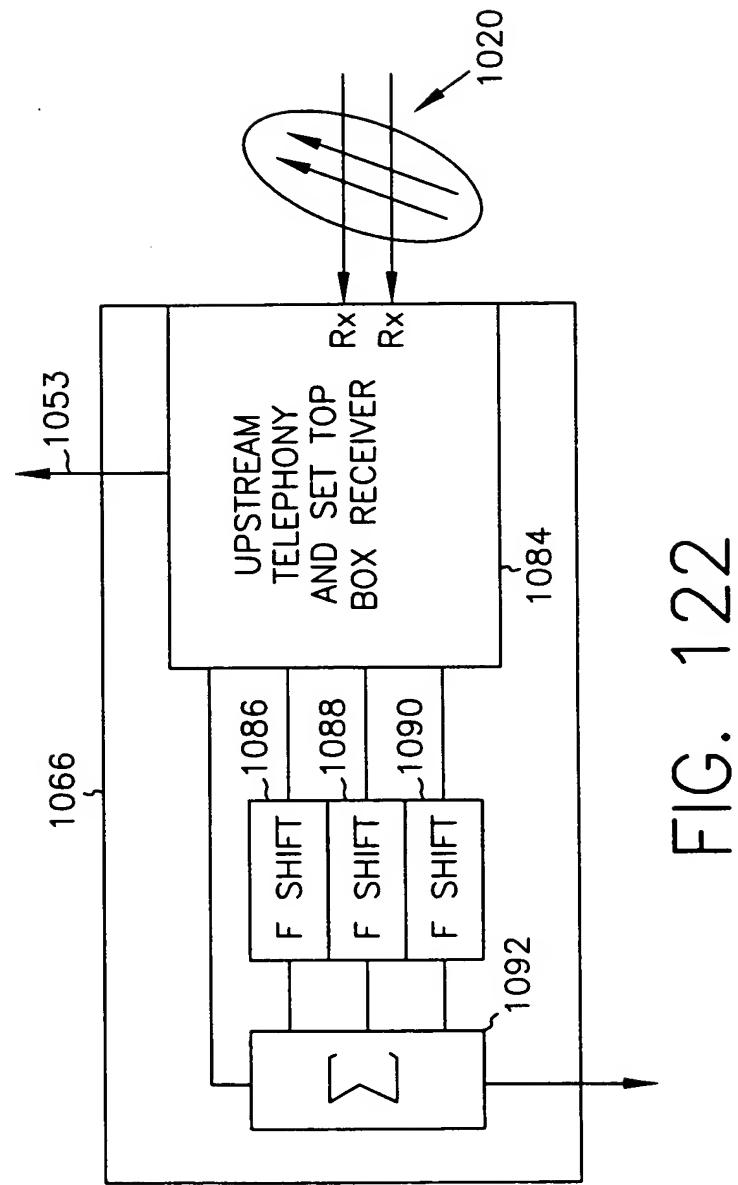


FIG. 122

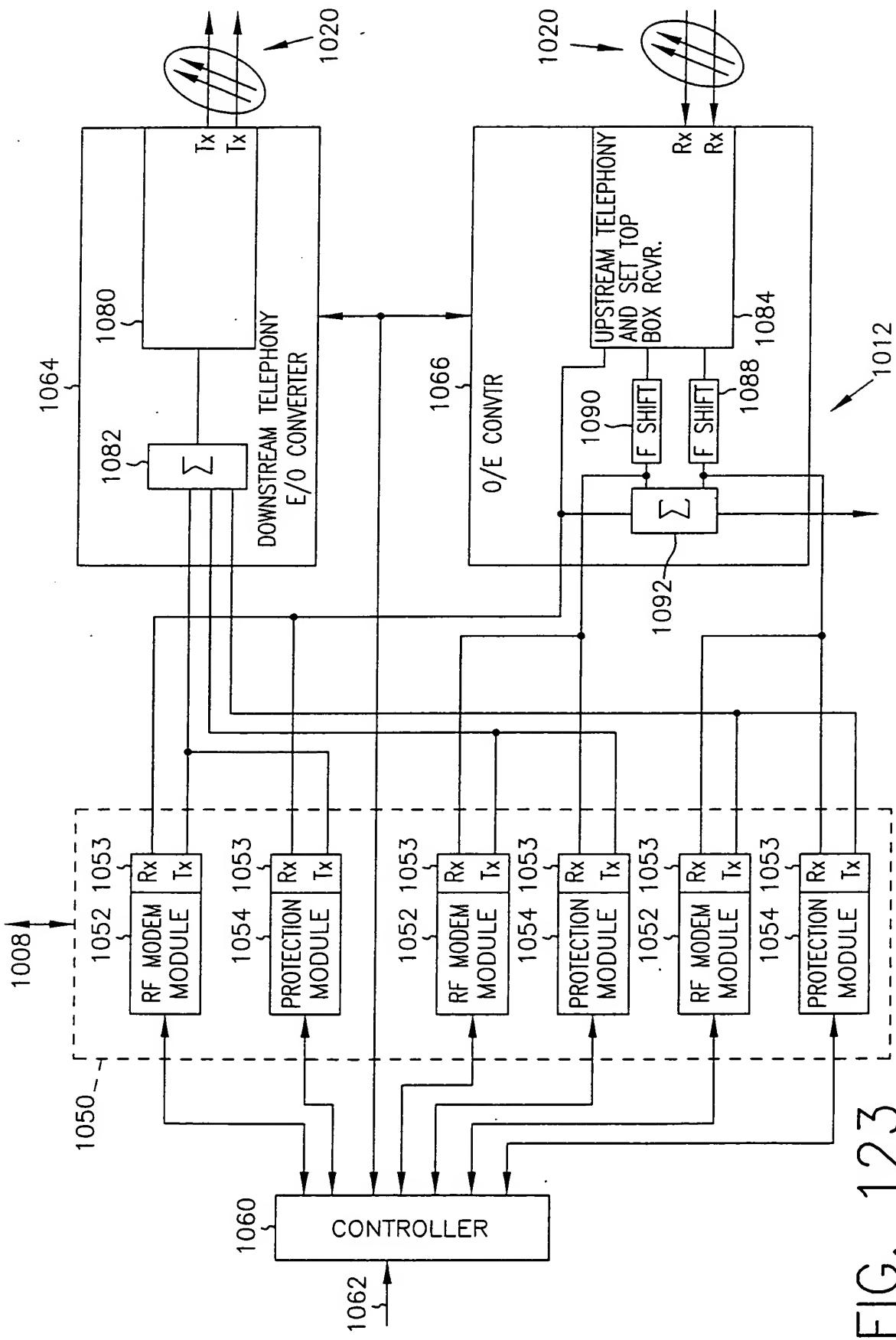


FIG. 123